

# S Y L L A B U S

OF THE

# COURSE OF LECTURES

DELIVERED IN THE

Baltimore College of Dental Surgery,

BY

PROFESSOR HARRIS.

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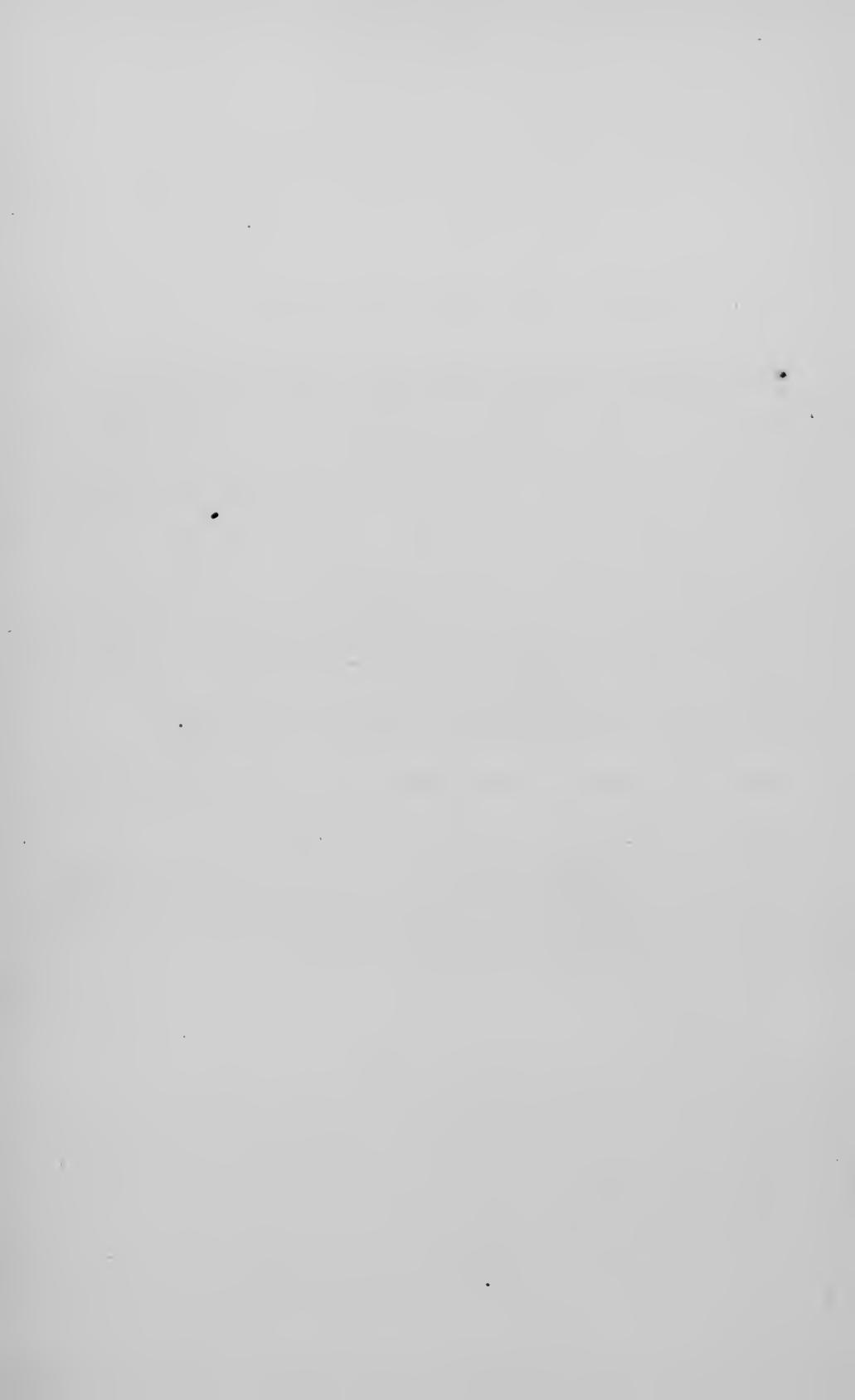
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THE following abstract, embracing most of the points discussed in each Lecture of the Course on the "Principles of Dental Science and Practice of Dental Surgery," delivered in the Baltimore College, has been prepared for the use of the Students of that Institution. It is intended to facilitate their progress by enabling them to study the subject of each Lecture before it is delivered; also, to assist them to prepare for the weekly examinations.

The blank interleaves are designed for such annotations as any may desire to make for future reference.

Lectures Eighty-five and Eighty-six properly belong to an earlier part of the Course as delivered.

BALTIMORE, *September*, 1859.



# PLAN OF THE COURSE.

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# S Y L L A B U S.

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## L E C T U R E I.

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### I N T R O D U C T O R Y.

#### T H E M O U T H.

1. GENERAL description of the mouth—elements which enter into its formation—the organs contained in it—where situated, and how bounded—its size as compared with other portions of the alimentary canal—it is the only portion of this passage under the influence of the will.
2. Mastication and insalivation.
3. The dimensions of the mouth of man are nearly equal—the antero-posterior is the greatest in lower animals.
4. The lips—their width usually determined by the width of the alveolar border—want of proper relative proportion between the former and latter sometimes owing to malformation.
5. Surfaces of the lips—their borders and commissures—*sub-nasal groove*—single and double hare-lip—*frænum labii*.
6. Anterior buccal cavity—mento-labial furrow—naso-labial line designated differently by different anatomists.
7. The free edges of the lips covered by integument of an intermediate color between the skin and mucous membrane.

8. Different sizes of mouths.
9. Cutaneous layer of the lips—sub-mucous layer—hair follicles—muscular layer—mucous layer—glandular layer—cellular tissue.
10. Blood-vessels and nerves of the lips.
11. Development of the lips—middle portion supposed by some to be formed of two lateral halves—hypothesis of Cruveilhier—appearance of, in infancy, in adults, in old age—functions of the lips—labial glands.
12. Lateral walls of the mouth formed by the cheeks—surfaces of the cheeks—external and internal—the former covered by skin—the latter by mucous membrane—duct of Steno—naso-labial groove—ramus of inferior maxillary.
13. The cheek of a quadrilateral form, and composed of a cutaneous, mucous, muscular, apponeurotic and glandular layer, blood-vessels, nerves, &c.—the skin firm and very vascular—the buccal salivary glands—molar glands—the muscular layer, how formed—apponeurotic layer—adipose substance—arteries, from whence supplied—veins of the cheeks—nerves derived from portio dura of seventh pair, infra-orbital—the mental branches of the fifth pair, &c.
14. Functions of the cheeks.
15. Upper wall of the mouth formed by palatine arch—how bounded—superior dental circle—velum pendulum palati—median line.
16. The palatine arch composed of fibro-mucous membrane, glands, blood-vessels and nerves—osseous frame-work thicker in front than behind.
17. The palatine salivary glands—how arranged—their orifices.
18. Development of osseous and membranous parts of hard palate supposed by some to be from two points—Cruveilhier's opinion.
19. The velum palati separates the mouth from the pharynx and nasal fossæ—its shape and offices—the uvula sometimes bifid

and sometimes wanting—the two lateral pillars of the velum, anterior and posterior—posterior lateral half-arches.

20. The tonsil glands are composed of groups of mucous follicles situated between pillars of lateral half-arches in the fauces—their use—the isthmus faucium.

21. The boundaries of the posterior orifice of the mouth.

22. The situation of the tongue—its functions—its size variable, and situated within the curve of inferior maxillary—is divided into apex, body and root—is retained in its position by ligaments, muscles and a reflection of mucous membrane. It is divided into two lateral halves by a furrow along the median line, and is covered by papillæ, called the *lenticular*, the *fungiform*, the *conical* and the *filliform*.

23. The structure of the tongue is muscular. Cellular tissue, partly serous and partly adipose, enters into its formation, as also blood-vessels, nerves and veins. Along its edges are a number of small glands with excretory ducts.

24. The tongue is the organ of taste, and is concerned in prehensions, mastication, suction, deglutition, articulation, &c.

25. The movements of the tongue, according to Cruveilhier, are extrinsic and intrinsic.

## L E C T U R E I I.

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### T H E T E E T H.

1. THE teeth are the organs of mastication—they have a semi-elliptical arrangement, and receive their chief support from the alveolar borders in which they are implanted—their articulation—their rudiments in jaws at birth.

2. The crowns of human teeth nearly uniform in length and regular in their arrangement. In the lower animals, some are longer than others, and are less regular in arrangement.

3. The curve of superior dental arch usually greater than that of the inferior—the teeth of the former, when normally arranged, shut on outside of those of the latter—manner in which the upper teeth strike the lower—the peculiar relationship of the former to the latter when the jaws are closed.

4. The incisors, cuspids and bicuspids of the upper jaw, larger than the corresponding teeth of the lower jaw.

5. Mastication facilitated by the uniformity of the length of the teeth—this function is sometimes impaired or prevented by abnormal arrangement of these organs.

6. The teeth have somewhat the appearance of an elongated cone—each root has a small opening, penetrating to the central chamber of the crown—the alveoli accurately moulded to the roots of the teeth—the conical shape of the latter prevents pressure on the blood-vessels and nerves at their extremities.

7. The permanent teeth divided into four classes—1. incisors: 2. cuspidati or canine: 3. bicuspids or small molars: 4. molars.

The incisors divided into central and lateral—the *dentes sapientiae*.

8. The crown of an incisor wedge-shaped—the edges of this class serve to cut or divide alimentary substances. The crown of a cuspid is of a conical shape—the apex being pointed. These teeth serve to tear food. The crown of a molar is cuboidal in shape—the grinding surface surmounted with tubercles is designed for bruising or grinding the food.

9. The number and situation of the incisors of each jaw—the shape of the crown and root of an incisor—the latter sometimes bifid—the upper incisors larger than the lower and those of both jaws divided into central and lateral.

10. Two cuspid or canine teeth in each jaw. These teeth are longer than any of the others—the upper are larger than the lower—their alveoli more prominent than those of any of the other teeth—this class of teeth is larger in carnivorous animals than in man.

11. The bicuspids—two on each side between the cuspids and molars, occupying the places of the molars of first dentition—shape of the crowns of these teeth—the upper larger than the lower—the grinding surfaces have two pointed tubercles separated by a groove or furrow—the roots of this class of teeth are usually single—in the upper jaw there is a deep vertical groove on each side, and sometimes they are bifid—the roots of the lower are round, and there are other differences between those of the upper and lower jaws.

12. The molars are situated behind the bicuspids—they have a broader grinding surface, and are most highly developed in herbivorous animals. In man, those of the upper jaw have from four to five tubercles—three and sometimes four or five roots—the lower have two roots—the first molar larger than the second or third—these teeth have from three to four tubercles.

13. A tooth is anatomically divided into three parts, *crown*, *neck* and *root*, and is composed of four distinct substances, *pulp*, *dentine*,

*enamel* and *cementum*,—structure of these tissues—opinions of different Microscopists on the subject—vascularity of dentine seems to be well established—the opinions of Blake, Fox and Bell on the subject—examples adduced in proof of—the fact demonstrated in one case by Dr. Maynard—in another by Mr. Norton.

14. The pulp-cavity extends through the roots of the teeth—is larger in young subjects than in old persons, and is sometimes obliterated by the conversion of the pulp into *osteodentine*.

15. The dental periosteum and lining membrane.

16. The chemical constituents of dentine—it differs in different teeth.

17. The enamel the hardest of the dental tissues—its appearance and color—thickest on parts of teeth subject to most friction—composed of hexagonal fibres radiating from the inner to the periphrial surface—its microscopical structure.

18. The chemical constituents of the enamel.

19. The temporary teeth—differences between them and the permanent teeth.

## LECTURE III.

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### ORIGIN AND FORMATION OF THE PULPS AND SACS OF THE HUMAN TEETH.

1. The progressive development of the teeth from the time of their first appearance as small mucous papillæ, until they are completed, is one of the most interesting of all the operations of the animal economy—it is begun and carried on in obedience to an established developmental law. The papillæ increase in size until they assume the shape of the future teeth.

2. The teeth of second dentition are in progress of formation before the loss of the first—the teeth in the early stages of their formation not studied by the early writers—EUSTACHIUS, the first to notice their position and arrangement in the foetal jaw—HEMARD the next—researches of ALBINUS—description given of them by Mr. JOHN HUNTER in the jaw of a foetus at three or four months—no new light thrown upon the subject by the researches of JOURDAIN, BLAKE, FOX, CUVIER, SERRES, DELABARRE and other writers—the rudiments of the permanent teeth, supposed by BLAKE and BELL to originate from the sacs of the temporary—the same opinion entertained by HERBERT, an earlier writer—the prolonged neck of the dental sac, called by Delabarre, *iter dentis*.

3. The opinion of Blake and Bell shewn to be erroneous by the more recent researches of Arnold and Goodsir—progress of the teeth from the appearance of the germs of the first set to the completion of the second.

4. At the *sixth week* of intra-uterine life, a deep semi-circular groove is seen, lined with mucous membrane—this widens from behind forwards, and constitutes the primitive dental groove.

5. By the *seventh week* a granular papillæ is seen rising up from the mucous membrane at the bottom of this groove—the germ of the *first temporary molar*.

6. By the *eighth week* another papillæ is observed between the middle and anterior curves of the ridges—the rudiment of the *temporary cuspidatus*.

7. During the *ninth week* the germs of the *incisors*, the central first, and afterwards the lateral are seen—the sides of the groove, at a later period begin to approach on each side of the first molar papilla, which meet and form a follicle around it—another follicle forms in the mean time around the cuspid germ.

8. The *second molar papilla* is developed near the end of the *tenth week*. Between the eleventh and thirteenth weeks processes of mucous membrane are sent up from each side of the groove, to form a distinct follicle for each papillæ, but the follicle of the second molar germ is formed during the thirteenth week.

9. The papillæ soon after begin to assume the shape of the future teeth, and for a while grow faster than the follicles; but as the latter become more developed, they form opercula, corresponding with the shape of their respective future teeth.

10. By the fourteenth week the outer and inner edges of the primitive dental groove meet.

11. The primitive dental groove is now situated on a higher level than at first—it contains the germs and follicles of the ten temporary teeth, and according to Goodsir, may now be called the *secondary dental groove*, provision being now made for the ten replacing teeth.

12. The formation of the crescent-shaped depressions behind the inner opercula of the follicles—the opercula, in the mean time, come together and close the mouths of the follicles, which now become sacs, and the papillæ, the pulps of the temporary

teeth—the crescent depressions become *cavities of reserve*, from which the pulps and sacs of the replacing teeth are formed. The primitive dental groove extends back of the second temporary, for the development of the germ and follicle of the first permanent molar.

13. The papillæ moulded into the shape of the future teeth—the base of each pulp perforated by as many holes as the tooth which it is to form has roots, and divided into as many secondary bases—development of a gelatinous granular substance from the coronal surface of the sac—this gradually spreads over the pulp.

14. Both membranes of the sac vascular—closure of the sac of first permanent molar—development of the germs of second and third.

15. Deposition of earthy salts takes place as soon as the apices and eminences of the pulps of the temporary teeth become vascular.

16. Recession of the cavities of reserve behind the temporary teeth—distension of the distal extremities and development of the pulps of the permanent teeth.

17. First permanent germ in the maxillary tuberosity until eighth or ninth month—the incisor pulps begin to elongate a little before birth, for the formation of roots of these teeth.

18. The vessels of the sacs of the permanent teeth derived from the gums and temporary sacs.

19. The papillæ of the second permanent molar appears about the seventh or eighth month—progress of its development,—formation of another cavity of reserve and development of the papillæ of the wisdom teeth—these situated in the upper jaw in the maxillary tuberosities, and in the lower in the base of the coronoid processes.

## LECTURE IV.

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### FORMATION OF THE HARD TISSUES OF A TOOTH.

1. Each tissue, except the cemental, formed in a manner peculiar to itself.
2. Formation of dentine—odontologist not agreed with regard to the manner in which this operation of economy is performed.
3. Four theories have been advanced upon the subject. *First*, the *ossification* theory of *Volcher Coiten*; *second*, the *transudation* theory of *Rau* and *Hunter*; *third*, the *conversion* theory of *Nasmyth* and *Owen*; *fourth*, the *deposition* theory of *Raschkow* and *Huxley*.
4. The first theory regard the formation of dentine as the result of the ossification simply of the dentinal pulp.
5. Characteristic differences between dentine and osseous tissue, first described by *Leeuwenhoeck* in 1683. Observations of this micrographer not noticed until revived by *Nasmyth* and *Owen*.
6. Ossification theory of dentine advocated by *M. Flourens* as late as 1842. Explanation given by the author of the transformation of the dentinal pulp.
7. Transudation or secretion theory not generally adopted until 1771. Peculiar views of *Rau* and *Hunter*. A tooth according to these writers a foreign body—an inorganic product.
8. According to *F. Cuvier*, teeth, nails, horns and hairs, are secreted by bulbs, although he believes a tooth to be somewhat assimilated to bone.

9. Theory of *S. E. Geoffry St. Hilaire*, makes a tooth a crystallized product of transudation, having same vitreous fracture and mode of re-union as stalactite.

10. *De Blainville* believes teeth to be dependencies of tegumentary system, unprovided with organic modifications.

11. According to *Serres, Blandin and Rousseau*, dentine is secreted by dental pulp, and the enamel deposited by internal membrane of sac. This theory still advocated by Retzius, and also in a modified form by Oudet.

12. The conversion theory supposes dentine formed by a series of transformation of the tissue of the pulp, and to be different from bone in structure and mode of development. Advocates of the theory divided into two classes—the first contend only for the partial transformation of dentinal pulp—the second for the total transformation. Among the advocates of the first are Nasmyth, Schmann, Kolliker and Lent—of the second, Professors Owen, Hannover, Todd and Bowman, Tomes and others.

13. The researches of Mr. Nasmyth show the structure of the dental pulp to be analogous to that of dentine, and the production of latter to result from transformation of former. Interfibrous substance formed by deposition of earthy salts in cells of reticular surface of pulp. Precise manner in which they are deposited, not perfectly understood, but furnished by red blood.

14. Tracing process of formation of dentine, attended with great difficulty—must judge of *modus operandi*, from progressive changes which take place.

15. Cellular appearance of pulp with fragments of dentine as described and represented, in diagrams by Mr. Nasmyth—inferences deducible therefrom.

16. Blood-vessels of pulp diminish in size as soon as sufficient quantity of earthy salts are deposited to form first or outer layer of reticular dentine—having performed this function they cease to convey red blood.

17. The frame-work of cells, according to Mr. Nasmyth, constitute the fibres of dentine, which, in this state, are spirally coiled into one another, and the points or projections rising from framework, correspond to centres of the cells.

18. The transition of elongated cells of pulp into dentine, begin on coronal extremity, and gradually spreads over the surface—always proceeding from without inwards.

19. The surface of dentinal pulp, beneath *membrane preformativa*, according to Professor Kolliker, is covered with a layer of cylindrical cells, with nuclei, and single or multiple nucleoli, and each successive internal layer becomes smaller and smaller. The dentine is produced first in the outer layer. The cells, the only tissue concerned in formation of dentine.

20. Kolliker and Lent contend that dentine results from transformation of part of anatomical elements of the pulp from those composing outer strata of cells.

## L E C T U R E V.

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### FORMATION OF THE HARD TISSUES OF A TOOTH.

CONTINUED.

1. PROFESSOR OWEN's explanation of the formation of dentine—centripetal calcification of the dentinal pulp.
2. Formation of dentine preceded by development of numerous minute elevations on surface of pulp at coronal extremity—these transformed into undulating ridges for reception of inner extremities of enamel fibres.
3. Preformative membrane assumes a stony hardness—dentine first formed at coronal extremity of pulp beneath investing membrane.
4. Three formative organs—pulp for dentine, sac for cementum, and enamel pulp for enamel—structure of each cellular—the cells have specific characters derived from "properties and metamorphoses of nuclei," determining the structural characteristics of each hard tissue.
5. Before dentinification begins, nucleus of cells of dentinal pulp fills parent cell with a progeny of nucleoli.
6. Dentine formed by deposition of earthy salts from surrounding plasma in interior of cells in a semi-transparent state, in central granular part of elongated nuclei.
7. Primitive existence of granular nuclei—their multiplication into primary cells—their elongated form, serial arrangement end to end, and terminal confluence indicated in dentinified pulp by

areae of dentinal tubes—interspaces of metamorphosed nuclei filled with earthy salts in clear and compact state.

8. Primitive boundary of parent cell retained through modification of arrangement of calcarious salts in boundaries and interspaces of cells.

9. The investing membrane of pulp first impregnated with hardening salts, but during this process it receives the impress of the corpuscular fibres of enamel organ.

10. Teeth of some animals supposed by Professor Owen to be unvacular.

11. Dentinal cells described by Hannover as situated in amorphous matter, having no proper envelop—arranged in superimposed layers—these at first spherical and disposed parallel, one to another, and perpendicular to surface of pulp—walls of cells and nucleus elongate simultaneously, having long anastomosing prolongations—envelop of cells forms wall and nucleus cavity of canalculus. The amorphous matter constitutes intertubular substance.

12. Tomes' explanation of formation of dentine, very similar to that of Professor Owen—development of pulp divided into three stages, *areolar*, *cellular* and *linear*—first embraces earliest appearance of pulp—second, when composed of nucleated cells, and the third, when cells assume a linear arrangement. Last stage immediately precedes dentinification.

13. Cells upon surface of pulp larger than those in interior—the smaller attain size of larger by the time dentinification begins.

14. Very little peculiar in views of Todd and Bowman with regard to formation of dentine.

15. Deposition theory of Raschkow modified by Huxley, differs from conversion theory of Nasmyth and Owens, in denying the agency of dentinal pulp in formation of dentine—first author thinks this tissue is deposited, layer within layer, between investing membrane and pulp.

16. Huxley's explanation somewhat obscure—he believes all the hard tissues of a tooth formed beneath investing membrane of pulp.

17. Deposition theory also supported by Magitot, who describes structural peculiarities of the pulp through various stages of development.

18. Last named writer denies that the amorphous matter in which the dentinifying cells are arranged, is part of dental pulp.

19. He believes that the formative elements of dentine are spontaneously generated at the surface of pulp.

20. Formation of dentine globules described by Czermak and Salter.

## LECTURE VI.

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### FORMATION OF THE HARD TISSUES OF A TOOTH.

CONTINUED.

1. THE enamel—earlier theories of manner of its formation—supposed to be product of ossification to the time of Rau, 1694, differing from dentine only in its greater density.
2. The secretion doctrine—supposed by defenders of, to be an exuded and crystallized substance—an inorganic product.
3. Theory of Rau developed by Hunter, who supposed enamel to be formed by a process similar to that of shell of an egg.
4. Hirrisant describes enamel as being a deposite of liquid secreted by glandular vesicles of internal membrane of dental follicles—the existence of these vesicles denied by G. Cuvier—views of last named writer upon this subject.
5. Enamel membrane of F. Cuvier—its existence recognized by other writers of French School.
6. Mr. Fox's explanation similar to that given by Hunter—Serres and Dujardin regard enamel as transformation of a membrane destined for formation of this substance.
7. Delabarre thinks enamel a product of dental pulp, formed by exhalents on its surface.
8. Adamantine organ of Raschkow—surrounds crown of growing tooth—internal surface studied with hexagonal fibres, corresponding to fibres of enamel—existence of these demonstrated by author in jaws of a pig.

9. Fibres of enamel organs contain characteristic nuclei—these sometimes furnished with nucleoli.

10. Nuclei described by Schwann as lying in minutely granular substance—peculiar appearance of which due to granulated cells—some of these prolonged into delicate fibres.

11. Fibres of enamel membrane supposed by Raschkow and Purkinje to be excretory ducts or little glands.

12. Views of Nasmyth accord for most part with those of Raschkow—enamel organ at first consists of whitish granular matter, in which three kind of cells are seen—the first are in interior of granular matter, having flattened and triangular form—the second are oval and form envelop to first—the third are in contact with dental pulp.

13. Professor Owen's description of manner of formation of this tissue.

14. Huxley and Kolliker deny existence of enamel organ between dental sac and pulp—they believe the enamel as well as dentine is formed beneath preformative membrane.

15. The doctrine of Huxley shown to be erroneous by Tomes.

16. Enamel organ supposed to be non-vascular.

17. Normally formed enamel covers every part of crown of tooth.

18. Existence of cementum not known until time of Leeuwenhoeck. He discovered it upon teeth of a calf. Tenon found it afterwards in cavities of incisors of a horse—first discovered on human teeth by Retzius.

19. Two theories advanced on manner of its formation—one regards it as the product of secretion of dental sac—the other as being formed by ossification of organs developed from external membrane of sac.

20. Neither of the two theories correct—its formation similar to growth of diameter of cylindrical bones—it is a sub-periosteal production.

21. Importance of cementum to animal economy.

## LECTURE VII.

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PROGRESS OF THE TEETH AND ALVEOLAR PORTION OF THE MAXILLARY BONES FROM BIRTH TO THE PERIOD OF ERUPTION OF EACH OF THE TEMPORARY TEETH.

1. PROGRESSIVE changes of teeth and maxillary bones during infancy and childhood—accretion of jaws influenced by development of teeth.
2. Temporary teeth at birth situated in open crypts of alveolar margin of jaws—the coronal extremities of former on a level with latter—the crypta little larger within than at their orifices—septum between central and lateral incisor has oblique direction from before backwards—other septa pass directly from anterior to posterior alveolar wall.
3. Sockets of cuspid teeth deeper than any of others—along floor of temporary molar crypts is a groove occupied by dental artery and nerve—this terminates at septum between cuspid and first molar in *anterior mental foramen*.
4. Behind crypt of first temporary molar is a large open cell containing pulps of second temporary and first permanent molars—these not separated at this time by any septum—molar crypts at birth.
5. Two halves of each jaw united by fibro-cartilage—this not ossified until later period.
6. Articular extremities of condyle not above the level of alveolar portion of jaws—angles of inferior maxillar very obtuse—coronoid processes more advanced—zygomatic processes of upper jaw proceed from crypts of second temporary molars.

7. Arch described by alveolar portions of maxillary bones—wider in the lower than the upper jaw—normal antagonism of teeth.
8. Surface of temporary central incisors dentinified and enamel formed at birth—laterals, not so far advanced, and cuspids still more backward—progress of formative process in first and second molars.
9. Relationship of dental sacs to inclosed developing teeth and to the gums—neck of dental sacs supposed to be hollow.
10. Extent of alveolar portion of upper jaw—proximity of alveolar crypts to orbits—locality of future maxillary sinus indicated by depression in outer surface of wall of nasal cavity.
11. Appearance of jaws of infant of six weeks—relationship of developing teeth nearly the same as at birth—articular processes of condyles—crypts of forming teeth deeper—progress of accretion of maxillary bones.
12. Jaws of infant at twelve weeks—changes in appearances of alveolar crypts—the teeth more advanced—progress of dentinification—development of alveolar septa.
13. Condition of jaws at eighteenth week—depth of lower—openings of alveolar crypts smaller than at twelfth week—changes which have taken place in relationship of dental sacs to inclosed teeth.
14. At five months jaws still more advanced—alveolar crypts deeper, and orifices smaller—changes effected by progressive growth of jaws and teeth—coronoid and condyloid processes—arrangement of teeth in jaws but little changed.
15. Situation of crypts of replacing teeth—their relationship to sockets of temporary.
16. Appearance of maxillary bones and teeth at six months—enlargement of mouths of alveolar crypts—formation of roots of temporary teeth—development of carneous substance on neck of dental sacs.

17. Two halves of lower jaw firmly united at twenty-eight or thirty weeks after birth—upper maxillæ still united by fibrocartilage—development of permanent molars—tuberosities of superior and angles and processes of inferior show marked changes.

18. At ten months two-thirds of crowns of lower, and one-half of upper central incisors, have emerged from gums—the other temporary teeth rapidly advancing—progress of permanent teeth.

19. Appearance of jaws and teeth at twelve months—at sixteen months grinding surface of first temporary molars through the gum—permanent teeth more advanced.

20. Changes observed at twenty, thirty and thirty-six months in maxillary bones and teeth.

21. Normal relationship of teeth disturbed by malformation of jaws.

## L E C T U R E V I I I.

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### FIRST DENTITION, AND COINCIDENT LOCAL AND CONSTITUTIONAL DISTURBANCES.

1. CONDITION of temporary teeth at period of eruption—process of dentinification not completed until after this operation of economy is effected.
2. Dentition does not commence until wants of child require use of teeth—teeth come through the gums two at a time—manner in which they arrange themselves in alveolar border.
3. Division of dentition into *papillary*, *follicular*, *sacular* and *eruptive* stages.
4. Normal periods for eruption of teeth vary in different countries and climates—they arrive earlier in some than others—nearest approximation in United States.
5. Variations of normal periods for each class—examples of eruption of teeth at birth—prematurely erupted teeth seldom firmly articulated—their sockets not sufficiently developed to afford proper support for them—extraction sometimes required.
6. Tardy dentition—extraordinary examples of—edentulous jaws—absence of only part of the teeth—examples of.
7. Supernumerary temporary teeth very rare—some examples mentioned.
8. Lower incisors usually erupted before the upper—cuspids and molars of superior maxillary usually appear through the gums before those of inferior.
9. Variations from normal periods of eruption less frequent in temporary than in permanent teeth.

10. Temporary teeth rarely assume irregular arrangement in jaws—author has seen but few examples.
11. Dental sac assumes its primitive follicular condition on eruption of tooth, and ultimately constitutes free margin of gum around the base of crown.
12. Order of the eruption of the teeth the reverse of development of germs—deviations from normal—examples of.
13. First dentition constitutes critical epoch of life—the mortality of the period greater than any other—Dr. Arbuthnot's estimate of.
14. Eruption of teeth a natural operation of the economy, but sometimes attended by great local irritation and constitutional disturbance.
15. Irritation produced by dentition depends upon irritability of general system—weak and sickly children sometimes get their teeth easily—children erupt their teeth more easily in winter than summer—opinions of different authors on the subject.
16. Cause of irritation supposed to be pressure of teeth against the gum—this opinion true to some extent—the pressure of the dentinifying extremity of root upon elongating pulp productive of more irritation and cause of the several constitutional disturbances that occur at this period.
17. Local irritation relieved by lancing gum down to advancing tooth—when this is done, the tooth rises in socket and pressure is taken from pulp below.
18. Objections to last mentioned operation not well founded—it often affords instant relief from most alarming symptoms.
19. Exact position of each tooth indicated by appearance of gums previous to eruption—heat and redness of gums and copious flow of saliva usual accompaniments of dentition.
20. The symptoms attending dentition often dependent upon previous morbid condition of general system—Mr. Hunter's enumeration of them and his explanation of cause of.

## L E C T U R E I X.

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### SECOND DENTITION.

1. THE destruction of roots of temporary, and eruption of permanent teeth a curious and interesting operation—time of its performance constitutes important epoch of life—importance of the change.
2. Eruption of permanent teeth harmonizes with changes taking place in jaws—number of teeth never diminished after completion of first dentition, except when removed by accident or for relief of pain.
3. As soon as alveolar border is sufficiently elongated, four permanent molars appear, one on each side in each jaw—age at which these are erupted—these sometimes mistaken for temporary teeth—their liability to decay.
4. Second dentition rarely productive of local or constitutional disturbance—morbid affections sometimes develop themselves on face, neck, in the ears, jaw and head, during this operation of economy.
5. Eruption of *dentes sapientiae* sometimes attended by great local and constitutional disturbance.
6. Dentition of adult teeth slower than infantile—six to eight years required for its accomplishment as far back as second molars—first dentition effected in less than half that time.
7. Normal periods for eruption of permanent teeth variable—a knowledge of these important to the dentist.
8. Period for eruption of each class of permanent series—phenomena connected with development of—Delabarre's speculations on.

9. Relationship of permanent to temporary teeth in jaw of child four years of age—the former so arranged as to occupy least space—imbricated arrangement—the lateral incisors behind centrals and cuspids—exception to rule.

10. The teeth nearest the gums first erupted—those which have longest roots last to appear.

11. Order of eruption of permanent teeth.

12. Dentinification of crowns of permanent teeth—completed between fourth and fifth year of age—the enamel formed very nearly at same time—the central incisors and first molars more advanced than any of other teeth—the process not fully completed until several years after eruption.

13. Enlargement of alveolo-dental canal—contraction of dental sac and shortening of cord leading from it to gums.

14. Remains of sac after crown of tooth has completely emerged from gums.

## L E C T U R E X.

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### ACCRETION OF THE MAXILLARY BONES.

1. STUDY of progressive enlargement of maxillary bones as necessary to the dentist as to the odontologist—the knowledge of this operation of economy indispensable in treatment of deformities of jaws and irregularity of teeth.
2. Increase of jaws during development of temporary teeth—when latter is completed, growth of former partially ceases for short space of time—subsequent accretion confined chiefly to back part of these bones.
3. Differences of opinion concerning increase of anterior portion of maxillary bones subsequently to eruption of temporary series of teeth—admeasurements made by different authors for purpose of settling question in dispute—different methods of procedure adopted.
4. Three methods of accretion in these bones mentioned by M. Delabarre—first induced by pressure of replacing teeth against each other during eruptive stage of dentition—second determined by liquor contained in dental sacs, and the third to enlargement of pores in the maxillæ—these explanations unsatisfactory—examination of their supposed mechanism—amount of credence to which they are entitled.
5. Parts of bones having greatest volume are most porous—but size of pores do not increase with growth of the parts—the premise false, the inference equally so—texture of bones more dense in adult than young child.
6. Mode of increase of diameter of cylindrical bones effected

by successive layers on exterior—growth of volume of maxillary bones effected in same way—earthy salts deposited in previously developed matrix of cartilage or glutin.

7. Increase of span of alveolar arches effected somewhat differently to a certain period—body of lower jaw connected with articular extremities at ramus by cartilage—ossification of this at early period of life.

8. Second temporary molar almost in contact with coronoid process when it emerges from gums—the entire arch at this time filled with temporary teeth—space required for the three permanent molars obtained by interstitial growth of this portion of bone.

9. Union of maxillary bones at symphysis—centres of ossification of these bones.

10. Anterior portion of jaws increase but little—relative space occupied by temporary and replacing teeth—permanent incisors and cuspids larger than temporary—bicuspids not so large as the teeth they replace.

11. Increase of anterior portion of jaws equal to one-third or one-half the width of replacing lateral incisor, but this growth does not always take place—premature loss of temporary tooth sometimes determines contraction of alveolar arch.

12. Interstitial growth of jaws determined by development of alveolar processes, first of replacing incisors, and then of the three permanent molars.

13. Law of development in its application to maxillary bones dependent upon previous condition of other parts—when rendered inoperative.

14. Doctrine of interstitial growth repudiated by most modern physiologists—no necessity for it in most bones—accretion of maxillary bones cannot be explained in any other way.

15. Growth of upper jaw does not differ materially from that of other bones—it augments by progressive ossification of subperiostial membrane which continues to form until the bone has acquired its full size—the sides of alveolar border elongate by growth of tuberosities.

## L E C T U R E X I.

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### ABNORMAL DEVELOPMENT AND MALFORMATION OF THE JAWS.

1. DEVIATIONS of maxillary bones from normal configuration as various as causes that produce them, and usually associated with abnormal arrangement of teeth—they may extend to every part of both jaws, or be confined to upper or lower, and to the body of the bone or only to alveolar portion.
2. The antagonism of teeth affected by deviations of maxillary bones from normal configuration.
3. Abnormal development sometimes result of hereditary proclivity to, at other times, of constitutional disease, but more frequently of disturbed dentition—fissure of hard palate cause of deformity of upper jaw.
4. Projection of alveolar border of upper jaw with narrowness of arch—this variety causes front teeth to project sometimes so much as to prevent upper lip from covering them—antagonism of molar teeth and mastication affected by it.
5. Projection and narrowness of alveolar portion of upper jaw first caused by abnormal arrangement of teeth, but may become hereditary by being frequently repeated—it then becomes an established configuration and peculiar to the family in which it has thus fixed itself—it never occurs as a consequence of mere freak of nature—it results from operation of established law of economy.
6. Preternatural narrowness of arch of upper alveolar border often causes increased width of lower.

7. Examples of projection of upper incisors and alveolar border with narrowness of arch sometimes met with—this variety probably occasioned by preternatural shortness of crowns of molar teeth—influence exerted by, upon configuration of lower jaw.

8. Next variety of abnormal development characterized by projection of lower jaw—lower incisors and sometimes cuspids, strike on outside of upper, constituting what the French call, *menton de galoché*.

9. This variety of deviation sometimes result of partial congenital dislocation of lower jaw, and at other times of excessive size of teeth of inferior maxillary.

10. The body of maxillary bones not necessarily affected by any of the foregoing descriptions of abnormal development—the roof of mouth higher and sharper than usual—does not describe a symmetrically rounded arch.

11. Most deviations from normal configuration of jaws caused in first instance by pressure, or mechanical force constantly exerted or frequently repeated and kept up for long time—remarkable case described by Dr. Hullihen in Am. Jour. Dent. Sci.

12. Tortion of jaws, so that upper teeth on one side of median line strike on outside of corresponding lower teeth, while the relations on the other side are the reverse of this.

13. Width of lower maxillary sometimes greater than upper, so that third molar of latter comes on inside of lower at each occlusion of jaws. This relationship sometimes reversed—this variety of deviation may become hereditary.

14. Fissure of hard palate accompanied by imperfection of alveolar border—defects of this kind not the result of arrest of development, but of absence of some of the anatomical elements of germ of the organs.

## LECTURE XII.

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### SHEDDING OF THE TEMPORARY TEETH.

1. OPINION of writers of sixteenth and seventeenth centuries, concerning shedding of temporary teeth—some supposed these teeth never had roots—others that roots remained in jaws and served as germs for permanent teeth.
2. Shedding of temporary teeth curious operation of economy—diversity of opinion as to manner in which it is effected—some attribute loss of roots to action of absorbents—others to chemical agents—first opinion inferential—second based upon only one of a series of phenomena.
3. Absorption theory of Mr. Fox—relative position of temporary and permanent teeth in jaws—absorption of former attributed to pressure of latter, but may go on independently of it.
4. Appearance of roots after destructive process has commenced.
5. Mr. Hunter repudiates idea that temporary teeth are pushed out by permanent—explanation given by this author is, that roots of first decay off to gum when crown drops out.
6. Process of destruction of roots of first teeth more minutely traced by Mr. Bell—it does not commence until wall of socket between permanent and temporary is removed—in other respects explanation of Mr. B. similar to that given by Mr. Fox.
7. Views of writers belonging to French School—Fauchard attributes destruction of roots of first teeth to action of corrosive fluid—Bunon thinks they are worn away by friction of replacing

teeth—Bourdet believes they are destroyed by chemical fluid secreted by carneous tubercle, situated behind them.

8. L'Ecluse says the roots are gradually broken up by a sort of maceration when vessels going to them cease to convey nourishing juices—Jaurdain ascribes loss of temporary roots: 1st. To pressure of permanent teeth: 2d. To action of overflowed juices conveyed to them, and lastly to action of absorbents.

9. Carneous tubercle developed from sac of replacing tooth described by M. Delabarre—its agency in the removal of every thing obstructing progress of new tooth—anterior wall of socket of this first removed and alveolo-dental canal enlarged—this effected, destruction of root commences—uncertainty of Delabarre whether tubercle accomplishes the removal of these parts by corrosive fluid secreted by it, or by action of absorbents with which it is endowed.

10. Temporary teeth naturally shed when root is destroyed, but loss of it sometimes determined by disease of socket—vessels of root occasionally remain after removal of calcarious phosphate and gelatine.

11. When carneous tubercle fails to come in contact with temporary root, that is not destroyed, and tooth remains firmly fixed in socket—in this case, replacing organ is erupted near it.

12. Destruction of root of permanent tooth sometimes effected in same manner as temporary—example furnished by anatomical specimen described by Delabarre.

13. Remarks on theories of different writers—author's views with regard to manner in which destruction of temporary root is effected.

## LECTURE XIII.

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### METHOD OF DIRECTING SECOND DENTITION.

1. HEALTH and beauty of permanent teeth influenced by manner of their arrangement—all deviations of these organs from normal position increases their liability to decay—irregularity can, in most cases, be prevented by proper attention to the mouth during second dentition.
2. Bad arrangement of teeth not always attributable to inattention of parents and those having care of children—the dentist frequently culpable.
3. System adopted in management of second dentition often faulty—discrepancy of opinion among dentists as to method proper to be pursued, has led to confusion and error in practice.
4. Dentist should be governed in management of dentition by indications of nature—mouth should be frequently examined during the shedding of temporary teeth and the eruption of permanent—circumstances under which temporary teeth should be extracted.
5. Premature loss of one or more temporary teeth followed by contraction of span of alveolar arch—replacing teeth are sometimes forced by this to deviate from normal position.
6. Extraction of first teeth often necessary to assist replacing organs in acquiring proper arrangement in dental circle—practice recommended by Mr. Fox—this criticised and censured by Mr. Bell—practice adopted by last named writer analogous to that which he condemns.

7. Mr. Bell's objection to practice of Mr. Fox, founded in part upon mistaken notion of relation of permanent to temporary teeth.

8. Extraction of temporary central incisors when replacing teeth are about to be erupted, or have passed through gum behind them—circumstances under which first laterals should be removed to make room for permanent centrals.

9. Length of time that should elapse after removing temporary central, before extracting laterals—the removal of latter not always necessary when space between them is too narrow for replacing teeth—crowns often yield sufficiently to pressure of advancing teeth to render extraction unnecessary.

10. M. Delabarre contends that the natural increase of anterior part of dental arch is sufficient to obviate necessity of removing laterals to make room for permanent centrals.

11. Strictures of last writer on practice recommended by Fox unjust, and founded in part upon misconception of what he says—practice opposed in one place recommended in another.

12. Predispositions in certain individuals supposed to prevent or retard development of maxillary bones—indication of such predispositions should be known by dentist, to enable him to foresee treatment it may be necessary to adopt.

13 Hereditary tendencies of maxillary bones.

## LECTURE XIV.

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### METHOD OF DIRECTING SECOND DENTITION.

CONTINUED.

1. INDICATIONS of increase in anterior portion of alveolar arch—growth affected by state of health during childhood—arrangement and size of temporary teeth—spaces between indication of accretion.
2. Relation of upper to lower teeth when mouth is closed—normal when front teeth of superior maxillary pass before corresponding teeth of inferior—deviation from, when former fall plumb upon latter, and abnormal when they come on inside of.
3. Teeth sometimes assume false relations from abnormal development of alveolar portion of maxillary bones—restoration of teeth to natural relation to each other often determines normal configuration of jaws.
4. Extraction of upper cuspids when spaces between them and central incisors not wide enough to admit laterals—time for performance of operation,—should never be done prematurely.
5. Very nearly same method of procedure pursued in management of dentition of lower incisors as upper—when they deviate from normal position in arch, pressure may be employed to prevent permanent irregularity—various methods of applying pressure.
6. Incisors having appeared and assumed their proper arrangement, attention of dentists next directed to first bicuspids—these teeth seldom prevented from acquiring normal arrangements for

want of room in alveolar arch, as first temporary molars are larger than teeth which replace them.

7. Second bicuspids always have sufficient room in dental arch, except second temporary molars have been prematurely removed.

8. Cuspids often prevented from assuming normal position in arch when temporary predecessors have been prematurely removed—side of the arch they most frequently occupy when they deviate from proper place—room to be obtained sometimes by extraction of first bicuspids, at other times by removal of second—circumstances which should decide the extraction of one instead of the other—first molar may sometimes be removed instead of either of the bicuspids.

9. Removal of cuspids sometimes necessary—circumstances which call for the operation.

10. First permanent molar rarely deviates from its proper position—sometimes slightly turned upon its axis—remedial indications in such cases.

11. Second permanent molar less liable than any of the teeth to assume abnormal position—examples sometimes met with—irritation produced by deviation of this tooth.

12. Eruption of *dens sapientiae* often attended with great irritation—alarming symptoms sometimes arise from—examples of and remedial indications of.

13. Eruption of teeth on outside of alveolar border—other deviations of teeth from normal position—remarkable examples of—extraction in cases of often required.

## L E C T U R E X V.

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### THIRD DENTITION.

1. EFFORT of nature to produce third and sometimes fourth set of teeth—the sixty-third and eighty-first year or interval between, supposed by some to be the period at which it is most frequently exerted—teeth of third dentition usually irregular in arrangement, imperfect in form and deficient in number.

2. Statements made by early writers to be received with considerable allowance—lady in her ninety-eighth year said to have erupted twelve molars mostly in lower jaw—liability of most persons to be deceived in matters of this kind.

3. Mr. Hunter witnessed case of reproduction of entire set with supposed renewal of sockets—infers from this that nature sometimes makes effort to renew the body in women at certain age.

4. Dr. Goode mentions case of lady who at seventy-four erupted several teeth—patient at same time recovered great acuteness of vision—same writer mentions another case of lady who erupted two molars at seventy-six, and recovered hearing at same time.

5. Remarkable examples contained in German Ephemerides—eruption of third incisor twenty-five years after loss of second—at eighty-two, same individual lost all his teeth, and two years after all were renewed—his hair at same time changed from white to dark hue.

6. Rapidity with which teeth are sometimes renewed—eruption of them in such cases said to be attended with great pain.

7. Case reported to author by late Dr. Miller, of Baltimore, of a lady who erupted complete set of teeth at sixty.

8. Examples of third dentition witnessed by author—one of reproduction of upper incisor several times—energies of system supposed to be exhausted by effort to produce complete third set.

9. Authors have not attempted to explain origin of teeth of third dentition—rudiments not developed at time of those of first and second dentition—law that determines their development not primitively impressed upon economy—law of origin and formation depends upon certain previous conditions.

10. Condition or location of parts determines functions which they perform—formation of teeth not an exception to rule.

11. Origin and development of teeth never the result of a freak of nature as some suppose—the law which determines their formation always the same—operation depends upon certain condition of mucous membrane in particular locality—when this condition occurs, teeth papillæ are developed.

12. When mucous membrane becomes grooved or indented along the line of alveolar border, germs of teeth spring up—these grow to pulps, are enclosed in follicles and sacs, and are finally converted into teeth—behind sacs of temporary, duplication of same tissue takes place, and then papillæ of replacing are developed.

13. The occurrence of accidental depressions in alveolar border lined with mucous membrane after loss of permanent teeth, bring into operation again law which determines development; first, of papillæ and then of pulps and teeth.

14. Teeth of third dentition have short blunt roots, and but shallow alveoli—their articulation weak, and teeth seldom remain long, and are of little use.

15. All formative operations of body so secretly carried on as to render it impossible to discover their precise *modus operandi*.

## LECTURE XVI.

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### MECHANISM OF THE ERUPTION OF THE TEETH.

1. OPINIONS of different authors as to manner of eruption of teeth—most of the explanations of mechanism of this operation of economy unsatisfactory.
2. Some writers attribute eruption of teeth to growth of root—others to moulding of socket around forming root—some suppose that opening through gum for passage of tooth effected by pressure of advancing tooth—others to action of absorbents.
3. Objections to above theories of eruption of teeth—root of tooth formed by dentinification of elongated pulp—latter cannot take place until crown is raised from bottom of alveolar crypt—hence growth of root has nothing to do in progress of tooth towards summit of gum—if tooth were pressed upward by forming root, elongating pulp would be caused to bulge out and would not have conical shape when dentinified—same objection applies to tooth being forced upwards by moulding of socket around it.
4. Relationship of dental sac to tooth and gum considered—sac attached at one extremity to neck of tooth, and at the other to gum above it.
5. Agency attributed by M. Delabarre to dental sac in passage of tooth from alveolar crypt through gum—this operation of economy effected in same manner as birth of child.
6. Progress of tooth proceeds no faster than sac contracts—as this goes on, pulp elongates for formation of root—latter operation always precedes dentinification.

7. Four operations performed at same time, and one always depending another; first, contraction of sac; second, development of carneous tubercle; third, progress of tooth, and fourth, elongation of pulp for formation of root.

8. This the only philosophical theory ever advocated—it explains upon true physiological principles this curious operation of economy—objections to it advanced by some that membranes of dental sac are of fibrous structure, and not endowed with contractile properties not well found—the inner membrane composed of layers of cells separated by interspaces not more than equal to half the diameter of the cells—its contractile properties exactly adapted to functions it has to perform.

9. Contraction of sac shown by its shortening as the tooth advances from bottom of socket towards summit of gums, until nothing remains of it but free edge of last named tissue around base of crown.

10. As soon as tooth comes through gum, the sac assumes primitive follicular condition.

## LECTURE XVII.

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### IRREGULARITY OF THE TEETH.

1. TEMPORARY teeth rarely deviate from normal position in dental arch—example of crowded arrangement and even irregularity are sometimes met with—author has seen several.
2. Irregularity of permanent teeth of very frequent occurrence—incisors and cuspids more liable to deviate from proper position than any of other teeth—bicuspids sometimes prevented from assuming proper position in arch.
3. Molars deviate from proper place oftener than bicuspids—first and even second occasionally slightly turned upon axis.
4. Dens sapientiæ sometimes prevented from coming out in lower jaw for want of room between second molars and coronoid process—in upper jaw they sometimes come out on back part of tuberosity, or on buccal or palatine surface.
5. Greater variety of deviation of upper incisors than of any other teeth—centrals sometimes come out before, but more frequently behind the arch—edges sometimes turned towards lips and roof of mouth directly or obliquely.
6. Lateral incisors sometimes behind and occasionally in front of dental arch—same teeth sometimes turned directly or obliquely across alveolar border.
7. When any of upper incisors come out behind the arch, lower incisors shut in front of them at each occlusion of mouth—this constitutes permanent obstacle to adjustment by efforts of nature—teeth can only be brought to proper place in arch in such cases by art.

8. Varieties of last kind of deviation mentioned by Mr. Fox—one described by author not enumerated by Mr. F.

9. Lower incisors sometimes shut in front of upper when there is no deviation of latter from normal position in arch—when this happens, it is result of preternatural elongation of lower jaw arising sometimes from excess in size of teeth, or partial congenital luxation of inferior maxillary.

10. Arrangement of upper teeth when alveolar portion of bone is compressed on sides—front teeth project and not covered by upper lip—sides of arch sometimes not separated more than an inch one from the other—deviation of teeth in cases of this kind usually occasioned by abnormal development of alveolar arch.

11. Irregularity sometimes occasioned by presence of supernumerary teeth—curious examples mentioned by Mr. Fox—several have come under observation of author.

12. Irregularity from tortion of maxillary bones—deviation from this cause very rare—when they do occur, almost always confined to permanent teeth.

13. Varieties of deviation of lower incisors very similar to upper—irregularity of these teeth not as conspicuous as that of upper, nor does it occasion as much deformity of face.

14. Transposition of teeth of more frequent occurrence than one would suppose—causes which give rise to it.

## L E C T U R E X V I I I.

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### IRREGULARITY OF THE TEETH.

CONTINUED.

1. REMARKABLE deviation of teeth from normal position—effects of upon configuration of maxillary bones—morbid phenomena sometimes produced by.
2. Eruption of upper central incisor in one of nasal cavities—example of reported to author—morbid effects resulting from.
3. Upper lateral incisor situated in upper and palatine part of alveolar border—effects of upon articulation of words—extraction necessary to relieve patient from inconveniences occasioned by.
4. Protrusion of incisor from upper part of alveolar border of superior maxillary—inconvenience experienced from.
5. Eruption of upper lateral incisor with palatine surface next lip—effects of upon appearance of mouth.
6. Upper cuspid behind and partly between central and lateral incisor—last named tooth in contact with first bicuspid—morbid effects occasioned by deviating tooth.
7. Upper cuspid situated in upper part of alveolar border—cusp of tooth looking towards roof of mouth—extraction necessary.
8. Root of upper cuspid situated in front of root of central incisor beneath nose, and crossing that of lateral incisor—crown in front and between last named tooth and first bicuspid—restoration to normal position in arch impracticable.

9. Coronal extremity of second bicuspid situated immediately beneath malar bone and covered by mucous membrane—morbid effects produced by abnormal position of—difficulty attending correct diagnosis.

10. Second upper molar embedded in alveolar border and covered by gum—grinding surface in contact with, and partly between buccal and palatine roots of first molar—alarming constitutional disturbance produced by abnormal position of—health restored by removal of tooth.

11. Protrusion of upper dens sapientiæ from outer surface of maxillary tuberosity—crown embedded in substance of cheek—  
inflammation and ulceration produced by.

12. Eruption of incisor of lower jaw from inner part of alveolar border beneath the tongue—irritation and ulceration occasioned by abnormal position of.

13. Crown of second bicuspid of lower jaw embedded in soft tissues of floor of mouth,—osteo-surcoma produced by irritation occasioned by abnormal position of tooth.

14. Grinding surface of lower dens sapientiæ in contact with posterior surface of neck of second molar—roots embedded in base of coronoid process—difficulty attending removal of tooth under such circumstances—alarming constitutional effects sometimes result from such abnormal position of tooth.

15. Dens sapientiæ between coronoid and condyloid processes of inferior maxillary.

16. Other deviations of teeth from normal position.

## L E C T U R E X I X.

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### TREATMENT OF IRREGULARITY OF THE TEETH.

1. EFFORTS of nature often sufficient to bring tooth which deviates from normal position in dental arch to its proper place—when aid of art is necessary, indications of nature should be attended to—cause of irregularity to be first removed.
2. Practicability of changing position of a tooth to almost any required extent well established—this well known to dentists of eighteenth century—not often attempted until within last fifty years—contrivances invented by Fauchard and Bourdet for correcting irregularity of teeth awkward in construction and not well adapted to the purpose.
3. Mr. Fox among the first to treat subject in full and explicit manner—directions given by this writer have for most part been followed to present time.
4. Treatment of teeth deviating from normal position varied to suit each individual case—in majority of instances, the sooner instituted, the better—position of a tooth may however be changed after twenty-fifth or thirtieth year, but can be more easily done previous to eighteenth.
5. Removal of cause first thing to be attended to—when occasioned by presence of temporary tooth, this to be immediately extracted—if efforts of economy not then sufficient to bring deviating tooth to proper position in arch, continuous pressure in direction tooth is to be moved applied and continued until adjustment of organ is effected.

6. When irregularity has been occasioned by narrowness of alveolar portion of maxillary bone, extraction of permanent tooth on each side necessary—second bicuspid, as a general rule, the most proper tooth to be removed, but first bicuspid or first molar, if carious, to be extracted instead of tooth first named.

7. Sufficient room having been obtained for deviating teeth, they usually, very soon assume proper position in arch—if they fail to do this, efforts of nature to be aided by application of ligatures—these to be changed every day.

8. When cuspids project for want of room between lateral incisors and first bicuspids, space to be obtained by extraction of tooth on each side—second bicuspid tooth to be removed when space between first and lateral incisor is equal to one-half the width of cuspid—when it is less than this, the first to be extracted.

9. Incisors never to be extracted in treatment of irregularity, except under very peculiar and urgent circumstances—sometimes necessary to extract lateral incisors—conditions under which operation should be performed.

10. When central or lateral incisor is turned transversely or obliquely across alveolar border, the tooth to be turned upon its axis by means of ring placed over it and ligatures, one fastened to each side and made fast to bicuspids or molars—the ligatures to be changed daily—time required to bring tooth to its proper position—when space between adjoining teeth not sufficient, it must be increased before attempting to turn deviating organ upon its axis.

11. When upper incisors project from narrowness of span of alveolar arch, extraction of bicuspid or molar on each side often necessary to bring deviating teeth to proper position—sufficient room having been obtained, action of upper lip will usually cause projecting organs to fall back to proper position in arch.

12. Sometimes necessary to widen span of arch to secure good arrangement to teeth—the means usually employed for accomplishment of this described.

## LECTURE XX.

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### TREATMENT OF IRREGULARITY OF THE TEETH.

CONTINUED.

1. MEANS employed to bring incisor of upper jaw forward to normal position in arch, when situated behind circle of teeth, so that corresponding lower tooth shall shut in front at each occlusion of mouth—these, when judiciously chosen, applicable to every variety of this kind of deviation.

2. Guttered plate adapted to lower teeth, with upper part forming inclined plane, recommended by Duval—action of this upon deviating tooth efficient—use of nearly discontinued on account of inconveniences it occasions patient.

3. Inclined plane of Catalan acts upon same principal as guttered plate of Duval, but less objectionable—consists of gold or silver plate passing on outside of lower teeth with cap on each side covering molar, and one or more inclined planes in front to act upon deviating incisors of upper jaw.

4. Inclined plane of author, improvement on Catalan's—less liable to be moved or displaced, and consequently acts more promptly on deviating teeth—manner of constructing it.

5. The use of ligatures as proposed by Delabarre, with metallic grates applied to two molars, or one molar and one bicuspid, to prevent front teeth from coming together—this method of procedure often successful, but frequently objectionable, as teeth occupying normal position are sometimes moved from proper place by ligatures while deviating teeth are being brought forward—author has used ligatures in many cases successfully.

6. Gold bar passing on outside of teeth, with block of ivory, on each side resting on molar, attached, to prevent front teeth meeting when mouth is closed, as recommended by Mr. Fox—this used as attachment for ligatures passed round deviating teeth.

7. Gold caps placed over molar or bicuspid on each side, better than blocks of ivory—they interfere less with functions of mastication, and are less cumbersome to mouth.

8. All appliances used for correction of irregularity to be removed daily, and teeth to which they are attached thoroughly cleansed each time—neglect of this precaution often attended with hurtful and sometimes serious consequences.

9. Means employed to lessen size of lower dental arch when front teeth come on outside of corresponding upper when mouth is closed—extraction of first bicuspid on each side—moving cuspid backward to vacant places made by removal of teeth designated—application of caps of gold plate to molars on each side—attachment of end of gold bar passing fourth of inch behind incisors to each cap—bar used as attachment to ligatures, employed to move incisors back in arch, until upper corresponding teeth strike in front of lower.

10. From three to six months required to effect necessary change in size of lower dental arch—danger of inflammation of peridentium of lower incisors and pulps of teeth, if moved too rapidly—this may result in disorganization of pulps, and death of teeth.

11. *Menton de Galoche* occasioned by partial congenital luxation of lower jaw removed by use of Fox's skull-cap and pressure upon teeth—operation tedious, requiring weeks and sometimes months for accomplishment.

## LECTURE XXI.

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### ABNORMALLY SHAPED TEETH—SUPERNUMERARY TEETH—TWO OR MORE TEETH UNITED.

#### 1. ABNORMALLY SHAPED TEETH.

1. TEETH often deviate slightly from natural shape—decided malformation occurs less frequently.
2. Author has two bicuspids with pulp which should have formed root reflected over crown in perfectly dentinified state—malformation occasioned by destruction of necks of dental sacs at the instant in which progress of teeth towards summit of gums should have commenced.
3. Roots of teeth often deformed in shape—numerous examples in Museum of Baltimore Dental College—author has some very remarkable specimens.
4. Deformity of crowns not so common—great variety of deviation from natural shape nevertheless have been observed—development of enamel nodules upon necks of teeth—protuberances on buccal and palatine surface—single rooted teeth with two well developed crowns.
5. Teeth often vary from natural size without absolute deformity—examples of deviations of this kind seen almost daily by dentists.

#### 2. SUPERNUMERARY TEETH.

6. Supernumerary teeth developed more frequently in front than in back part of alveolar arches, and in upper than in lower jaw—usually situated between central incisors—sometimes found

between bicuspids and molars—author has seen them behind dens sapientiae of upper jaw—often found behind the incisors.

7. Crowns of supernumerary teeth usually of conical shape, and roots short—exceptions to rule sometimes occur—supernumerary incisors like other teeth occasionally seen—in such cases, though number of teeth complete without them, they belong strictly to regular series.

8. Law determining development of supernumerary teeth same as that which determines development of those belonging to regular series—their formation the result of accidental condition of mucous membrane, lining alveolar groove in which other teeth papillæ have their origin.

9. Presence of supernumerary teeth often gives rise to abnormal arrangement of those belonging to regular series—they are also sometimes source of irritation and disease to the gums and alveolar processes—antagonism of other teeth often interfered with by them as well as distinct enunciation of certain words.

### 3. UNION OF TWO OR MORE TEETH.

10. Two kinds of union of teeth take place ; first, of roots by exodontosis or hypertrophy of cementum ; second, by fusion or growing together of pulps previous to commencement of dentinifying process—examples of first of frequent occurrence,—the latter more rare.

11. Author has seen three teeth united as consequence of morbid growth of cementum—example of this kind in Museum of Baltimore Dental College.

12. Union of crowns as well as roots more frequent in temporary than permanent teeth—author has, however, two specimens of latter, and has seen several others—most remarkable example of union of first lower molar and supernumerary bicuspid.

## LECTURE XXII.

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### EFFECTS OF CONSTITUTIONAL DISEASE AND HABITS UPON THE DEVELOPMENT AND PHYSICAL CONDITION OF THE TEETH.

1. STATE of general health, and manner in which functional operations of body are performed during infancy and childhood, determine physical condition of teeth, and their susceptibility to morbid impressions.
2. In phenomena connected with development of organs of body, none more interesting and important than those exhibited in origin and formation of teeth—nature of changes that take place in the various organs of body during successive periods of life, the series of events which establish for each, term of existence, growth and decay, should be studied by dentists as well as general practitioner—importance of such knowledge.
3. Consequence resulting from disturbance of laws of health, always more or less serious—formative operations of economy effected by it.
4. Each portion of body developed in its own proper turn—epochs of commencing existence, growth and decay have relation to its importance in government and preservation of being.
5. Every thing in nature subject to law—when due course of law is interrupted in animated nature, irregularity results as necessary consequence—determined natural configuration in the whole body, and in every organ and part in perfect health—normal configuration necessary to proper performance of functions to which body, organ or part is destined—aberration from this configuration constitutes unnatural formation.

6. Relations of natural development to perfection of former, and regularity of epoch in course of growth—growth of organs affected by alliances with each other—connection of organs in performance of functions.

7. Occurrence of convenient and natural configuration of organ, no certain evidence of perfectly healthy standard of structure—this as true of teeth as other organs of body—the recurrence of, at particular periods—certain stages in process of development, establishes only certain standards of health.

8. Origin, progressive formation and arrangement of teeth—the changes which they undergo in passing from one stage of development to another, are as curious as any observed in formation of any other organs of body—study of this subject necessary to comprehensive knowledge of indications of healthy structure, or of liability to disease.

9. Influence of improper food taken in stomach during infancy has on development and physical condition of teeth—facts ascertained in relation to subject.

10. Influence of unphilosophical modes of living on teeth, and organism generally.

## L E C T U R E X X I I .

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### SEMIIOLOGY OF THE MOUTH.

#### 1. INTRODUCTORY REMARKS.

1. DIFFERENCES in liability of different individuals to disease, and of teeth to decay—the reason of this not satisfactorily explained—the subject, one of importance, both to dental and medical practitioner—knowledge of signs—indication of these differences should be thoroughly studied.

2. Relative proportions of different elements entering into formation of body vary—scarcely any two persons possessed of exactly same susceptibility to morbid impressions—same causes of disease often produce different effects on different individuals—susceptibility and tendency of body, or part determines nature and extent of effects produced by them—no part of body exempt from this law of cause and effect—teeth, gums and alveolar processes, as subject to it as other parts—owing to this, teeth of some decay rapidly as soon as through the gums, while others remain sound through life.

3. Susceptibility of teeth to decay determined by physical condition—this, after completion of dentinification, changes but little—remains the same through life, except that they acquire slight increase of density.

4. Susceptibility of other parts of body to morbid impressions may be increased or diminished at any period of life—though innately delicate, they may become healthy, and their tendency to disease diminished.

5. Teeth not governed by same laws as other parts of the vital economy—they differ in manner of formation, and for most part, their diseases are different—they are not endowed with restorative powers—in process of cure, Art must do all.

6. Appearances of teeth indicate character of innate constitution of individual, as well as tendencies of body to particular kinds of disease,—these signs more reliable than those furnished by the tongue, eyes, cheeks, action of respiratory muscles or beating of pulse.

7. Teeth of child apt to be like those of parent whom it most resembles, in color, shape and size—if those of latter are soft or badly arranged, those of former will usually have similar imperfections.

8. Character of temporary teeth determined by state of mother's health during intra-uterine existence of child—if mother be healthy, teeth, as general rule, hard and not easily acted upon by causes that produce decay.

9. State of mother's health and quality of food influence condition of teeth—temperament also has same effect—Mahon's researches upon this subject interesting and worthy of careful study—conjectures of this writer, if not strictly true, worthy of notice.

10. Delabarre's criticism upon views of Mahon—opinion of Lavater with regard to importance of physiognomical and pathognomical and semeiotica of health and disease to physicians.

## L E C T U R E   X X I V .

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### 2. SEMEIOLOGY OF THE TEETH.

1. ASPECT of teeth, lips, tongue, gums, salivary calculus and fluids of mouth, as variable as is susceptibility of organism of different individuals to disease—teeth of no two individuals present precisely same appearance—these differences observable to those in habit of studying peculiarities of the organs, which not only vary in shape, but also in size and color.

2. Differences in susceptibility of teeth to disease indicated by shape, size and color of organs—these to be understood and appreciated by dentist, must be studied and discriminated.

3. Division of teeth into classes, according to characteristics possessed by each.

4. *Class First*,—teeth belonging to this, of hardest description, and earthy salts exist in greatest abundance—organs, medium size, each class of uniform dimensions, perfect in form, white, slightly tinged with yellow near gums.

5. Teeth of first class found in mouths of persons of sanguinobilious temperaments, the sanguine predominating, with good innate constitutions.

6. Teeth of this sort rarely decay—they indicate constitution free from proclivity to disease—not indices to present state of health—vital powers of body may have become impaired and system acquired susceptibility to morbid impressions.

7. Persons of all nations may have teeth of first class, but are more common among laboring people of regular habits in healthy districts of country—often seen in England, Ireland, Scotland and

middle parts of United States, in some portions of Mexico, Russia, Prussia, France and Switzerland.

8. Indications of teeth belonging to first class—Lavater's opinion of, concerning those who have them.

9. Teeth of first class seldom decay—not easily acted upon by chemical agents—their presence sometimes source of disease to peridenteum, alveoli and gums.

10. Variety of salivary calculus on teeth of this class—seldom deposited in large quantity—of dark brown or black color.

11. *Class Second*,—teeth of this class usually have a slightly blueish tinge, crowns long, incisors thin and narrow, cuspids round and pointed, bicuspids and molars small in circumference—deeply indented on grinding surface.

12. Above description of teeth of softer texture than first class, more readily acted upon by corrosive agents, and when attacked, decay rapidly—very subject to soft white caries.

13. Color of decayed dentine determined by density of tissue— influenced sometimes by other circumstances, perhaps by modification of agents causing structural alteration.

14. Last description of teeth often affected by atrophy—they are also more liable to erosion than first class.

15. Teeth of second class indicative of weakly innate constitution, of temperament in which sanguinous does not predominate, and of blood containing too large relative proportion of serum— found more frequently among females than males—met with among inhabitants of all countries.

## L E C T U R E X X V .

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### 3. SEMEIOLOGY OF THE TEETH.

CONTINUED.

1. *Class Third*,—teeth belonging to this differs in many respects from second, but in texture and susceptibility to disease, similar—are larger than first or second class—have irregular surfaces, often with protuberances on sides and corresponding indentations.
2. Crowns of incisors broad, long and thick—all the teeth have muddy white color—palatine surface of upper incisors often have deep indentations.
3. Arrangement usually regular—incisors often project—alveolar ridge describes broad arch—consequences of excess in size, both of teeth and alveolar portion of maxillæ.
4. Teeth decay rapidly—disease sometimes baffles skill of dentist—are liable to be attacked at almost every part of surface of crown—several members of same family often lose all their teeth early in life—author has frequently known this to happen.
5. Teeth of this description benefitted by amelioration or change in state of constitutional health, secretion of mouth being rendered less corrosive—when this happens, preservation of teeth less difficult.
6. *Class Fourth*,—teeth have white chalky appearance, soft texture and unequally developed—easily acted upon by chemical agents—preserved with difficulty—sometimes set at defiance, skill of dentist.
7. Teeth of this, and those belonging to third class, according to Laforque, found in persons of lymphatico-serous tempera-

ments—blood pale, fluids of mouth rather viscid and secreted in large quantity.

8. Teeth of this description indicative of bad innate constitution—more common among females than males—teeth usually exceed those of normal size.

9. *Class Fifth*,—teeth usually small, though often of normal size, very white, enamel, presenting pearly appearance—supposed by many to be indicative of tendency to phthisis pulmonalis.

10. This description of teeth often remain healthy until twentieth or thirtieth year, unless individual is attacked with febrile disease, or general health becomes seriously impaired; in this case, teeth soon attacked by caries, and decay rapidly.

11. Inference deducible from above facts—fluids of mouth in strumous subjects when free from actual disease or other morbid proclivity, less prejudicial to teeth than in most other habits of body—Delabarre thinks caries of teeth supervene to phthisis pulmonalis, and is consequence of general delibity—this opinion shown to be not well founded.

12. Density of teeth never diminished, and but very slightly increased, subsequently to completion of dentinifying process—susceptibility to action of chemical agents therefore never increased or diminished after this period.

13. Teeth of sanguino-mucous temperament, according to Duval, when patient has suffered from inflammatory or febrile disease during early childhood, subject to what he calls decorticating process.

14. Characteristics of teeth not noticed in those of the five classes described—intermingling of those of one kind with others—value of deductions deducible from them—each indicative of state of health at time of dentinification.

## L E C T U R E   X X V I .

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### 4. SEMEIOLOGY OF THE GUMS.

1. GUMS, unlike teeth, subject to laws of vital economy—appearances of vary with state of general health, and affected by arrangement of teeth—they are not indicative of state of innate constitution.

2. Cause of disease in gums—local irritation produced by salivary calculus, decayed, dead or loose teeth, irregularity of teeth, vitiated condition of buccal fluids, but susceptibility of this structure determined by state of constitutional health.

3. Appearance of gums cannot, it being affected by so many causes, does not always unerringly indicate pathognomonic condition of general system.

4. Sympathies between gums and other parts of body greater during childhood than at other periods of life—susceptibilities of every part of organism greater at this than later in life—general health also more fluctuating.

5. Gums usually present less variety in appearance after the period of adolescence than before—irritability not so great now, consequently this structure less susceptible to action of irritants—when vital energies of body begin to weaken, latent morbid tendencies are heightened, and susceptibility of gums to action of irritants increased.

6. In best constitutions, gums have, previously to twentieth year, pale rose-red color, firm consistence, slightly uneven surface and festooned margin along outer surface of teeth—mucous membrane has fresh lively roseate hue.

7. Few weeks previous to shedding of temporary teeth increased redness and slight tumefaction of edges of gums around necks of—eruption of teeth, whether temporary or permanent, preceded by similar phenomena in this structure.

8. When general health continues good, if teeth be well arranged, above described appearances continue except slight diminution of color, until forty-fifth or fiftieth year, when they assume increase of redness—if health is impaired or teeth badly arranged, slight tumefaction of margins will take place.

9. Gradual wasting of edges of gums, cause of, when teeth are very hard;—Mr. Bell's opinion of—not an indication of senile decay.

10. Severe constitutional disease increases irritability of gums;—causes afflux of blood to, and stasis of this fluid in their capillaries.

11. Teeth of persons having gums of this description rarely decay.

12. In sanguineous persons, gums of a deeper vermillion, edges rather thicker, structure less firm, surface not so rough, but more humid;—in this case structure more sensitive and susceptible to action of local irritants.

13. In sanguineo-serous subjects, gums pale, margins thin, well festooned, and often exude after twenty-fifth year mucopurulent matter.

14. In scorbutic habits, gums have a reddish brown color, margins imperfectly festooned and thick, very susceptible to action of irritants, and bleed from slightest injury.

15. In scrofulous individuals, gums have a pale blueish appearance, become flabby when exposed to action of irritants, exhale nauseating odor, detach themselves from necks of teeth—other morbid phenomena to which they are subject.

## L E C T U R E X X V I I .

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### 5. SEMEIOLOGY OF LIPS, TONGUE AND FLUIDS OF MOUTH.

#### 1. THE LIPS.

1. APPEARANCE of lips vary with state of general health—innate constitution not ascertainable from color and physical condition of lips.

2. Lips thick, thin, pale, red or rosy, according to temperament of individual and quality of blood.

3. Firmness, with pale rose-color of mucous membrane indicative of good blood and good constitution—when color is deeper than pale-rose, indicates sanguino-serous blood—lymphatico-serous subjects have soft, pale lips.

4. Lips usually deep red in plethoric habits and of firm consistence—softness without loss of redness, indications of—when blood is serous, lips soft and mucous membrane of mouth generally very pale.

5. Importance attached by Laforgue to physical condition and color of lips as indicative of quality of blood and state of constitutional health.

6. Diagnostic and prognostic import of secretions of lips—white mucous coating indication of irritation and inflammation of intestinal canal—different kind of coatings of lips and indications of.

#### 2. THE TONGUE.

7. Semeiology of tongue as regards physiological condition of general system and qualities of blood and state of health similar

to that of lips—pathognomonic indications of a more reliable character—these vary according to temperament and habit of body.

8. Indications furnished by tongue divided by Professor Schill into *objective* and *subjective*—to former belong changes of size, form, consistence, humidity, color, temperature, secretion and motion—to latter anomalous sensations of taste.

9. Enlargement of tongue, except in inflammation or congestion of organ, unfavorable sign—in cerebral affections combined with coma, a dangerous phenomenon—not dangerous when the result of salivation or excessive use of spirituous liquors, nor in gastric irritation, chlorosis, hysteria or epilepsy.

10. Hard, retracted and pointed tongue with diminution in size, as occurring in typhus fever, cholera, inflammation of lungs and acute cerebral affections, unfavorable signs.

11. Moist tongue usually a favorable indication and dry tongue unfavorable—various kinds of coating observed on this organ and indications of.

### 3. FLUIDS OF THE MOUTH.

12. Chemical properties of fluids of mouth—in health, mucous secretions acid and salivary alkaline—experiments of Dr. Mitchell and inferences of, with regard to cause of caries of teeth.

13. Saliva, in good constitutions and in health, has light, frothy appearance without viscosity,—floats upon and mixes with water—viscosity of this fluid indicates bad health or bad constitution, and does not mix readily with water—in disease of gums, secreted in increased quantity and rendered viscid—flow of it also increased in pregnancy, and in certain pathological conditions of general system—various physical properties of this fluid.

14. Mucous secretions of mouth, physical characteristics and indications of.

## LECTURE XXVIII.

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### DISEASES OF THE TEETH.

#### 1. EROSION.

1. EROSION essentially same as caries, produced by same cause, and like last named affection, consists in chemical decomposition of earthy salts of affected part—structural alteration in former, commencing on surface of, and confined to the enamel—in the latter, though sometimes commencing in this tissue, the dentine principal seat of disease.
2. Enamel often attacked previous to eruption of teeth—termed in this case, *congenital erosion*—when it occurs subsequently, it is called *accidental*.

#### 1. CONGENITAL EROSION.

3. Teeth sometimes so badly eroded on eruption from gums, as to render their preservation impossible—every part of enamel liable to be attacked—occurs most frequently on part last formed.
4. Cause of erosion, chemical action of acidulated fluid contained in dental sacs—in good constitutions and in health, this fluid bland, somewhat resembling in physical and chemical properties, liquor amni—crowns of teeth previous to eruption bathed in it.

5. This fluid in some habits always acid, and teeth more or less eroded on eruption from gums—when such habit is hereditary and derived from both parents, the teeth of all the children liable to be thus affected.

6. Fluid of dental sacs in cachectic habits, rendered acid by occurrence of severe febrile and inflammatory diseases, also from protracted use of mercurial medicines.

7. Treatment of congenital erosion—remedial, hygienic—when confined to one or two points, and surrounded by firm healthy enamel, further progress of affection can, in most cases, be arrested.

8. When liquor contained in sacs of teeth is acid, mucous secretions of mouth usually too acid to be neutralized by alkalinity of saliva.

## 2. ACCIDENTAL EROSION.

9. This may occur at any period of life—term erosion only applied when structural alteration is situated on labial, buccal, lingual or palatine surface of teeth—caused by chemical action of secretions of mouth, especially the mucous.

10. Prevention of erosion after eruption of teeth—treatment—this same as that for caries.

## L E C T U R E X X I X.

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### DISEASES OF THE TEETH.

#### 2. CARIES.

1. CARIES of the teeth—in what respect structural alteration designated by this term differs from caries of true osseous tissues—frequency of its occurrence—rapidity of its progress—destructive character of.
2. Attacks of the affection often insidious—its existence frequently not suspected until it has made considerable progress—indications of when not seen—parts of a tooth first attacked.
3. Color and consistence of the decayed part—different physical characteristics of—causes to which these are attributable.
4. Mr. Thomas Bell designates the structural alteration by the name of gangrene—this term not applicable, as it refers more particularly to pathological condition of soft part—attempt to substitute this name for caries not successful.
5. Progress of disease always from without inwards—sometimes commences on surface of enamel, but more frequently on that of subjacent dentine, where first named tissue is defective.
6. After destruction of crown and neck of tooth, progress of disease often partially arrested—roots, especially of incisors and cuspids, sometimes hollowed by it—roots of molars often remain without suffering decomposition, retained in mouth by connection of peridentalum with gums after sockets have become obliterated.
7. The terms, *superficial*, *deep-seated* and *complicated*, sometimes applied to disease, to designate progress it has made and implication of other parts, as lining membrane and pulp of tooth in the affection.

8. Seven varieties or species of caries enumerated by M. Duval: *calcareous, peeling, perforating, black, deruptive, stationary and wasting*—first, consists of partial decomposition of imperfectly organized enamel—second, characterized by yellowness of enamel which from partial decomposition scales off—third, is when disease begins under enamel and proceeds towards pulp-cavity—fourth, applies to disease when affected part is dark brown or black, and is of firm consistence—fifth, consists of abrasion of anterior surfaces—sixth, when progress of disease is very slow—seventh, gradual denuding of grinding surfaces of molars.

9. Gradual softening of teeth designated by M. Delabarre, *molities ossium*—the affection supposed to differ from caries, but essentially same disease and produced by same cause.

10. Liability of teeth to ache after having become seat of caries—pain not often experienced until structural alteration has penetrated nearly to pulp-cavity—some teeth wholly destroyed by caries without becoming seat of suffering to individual.

11. Temperament and state of constitutional health has much to do in determining proclivity of teeth to ache—teeth of females during pregnancy very liable to ache.

## L E C T U R E   X X X .

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### DISEASES OF THE TEETH.

#### 2. CARIES—DIFFERENCES IN LIABILITY OF DIFFERENT TEETH TO BE ATTACKED BY CARIES.

1. TEETH well formed, well arranged and of compact texture, seldom attacked by caries, and when they are, the disease progresses very slowly—when soft, easily acted upon by chemical agents, and decay rapidly.

2. Density of teeth determined by state of general health at time of dentinification—shape and arrangement by peculiarities of parents' teeth, whose constitution and temperament individual has inherited, and condition of temporary teeth and gums—not strange that physical condition of dental tissues should be thus influenced.

3. Increased action in one part of body followed by diminished action in some other part—examples illustrative of truth of.

4. Teeth acquire disposition to decay, from want of healthy action during formation—this shown by fact that these organs usually decay in pairs—one or two pair often decay early in life, while all the others remain sound to advanced age.

5. Mr. Fox's opinion with regard to change in economy of teeth—caries of, supposed to be result of certain states of constitutional health—this view of subject not wholly correct.

6. Amongst remote causes of decay, Mr. Bell attributes deleterious changes in constitution of teeth, subsequent to formation, often occasioned by use of mercurial medicines—constitution, or rather physical condition of teeth, never thus affected—secretions

of mouth may be rendered deleterious to organs by constitutional disease, or by use of mercury.

7. Opinions of last named writers founded upon erroneous views with regard to nature of dental caries—upon supposition that the disease is an inherent and a vital action.

8. Gums and alveolar processes sometimes destroyed by use of mercury, and teeth loosen and drop out without being affected by caries—density of teeth never change from constitutional effects of this agent, nor from disease of general system.

9. Hard teeth and soft teeth usually inherited by child from one or both parents—hence liability of these organs to caries may be said to be hereditary—when physically well constituted, they rarely decay; in proportion as they are otherwise, are they easily acted upon by acidulated fluids of mouth.

10. Hereditary tendency of teeth to decay—Mr. Bell's opinion concerning—true in part, but not wholly.

## LECTURE XXXI.

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### DISEASES OF THE TEETH.

#### 2. CARIES—CAUSES OF.

1. EARLIER French writers entertained vague and confused notions of cause of dental caries—was thought to be result of action of chemical agents, of vitiated saliva, putrescent remains of food lodged between and in interstices of teeth, and from acids and corrupted fluids conveyed to organs for nourishment—similar notions entertained by English writers at commencement of last century.

2. Supposed discovery of identity of structure between dentine and bone by Mr. Fox, led to adoption of opinion that caries was result of inflammation of this tissue—doctrine subsequently advocated by Mr. Thos. Bell—if it were true, disease would not always commence on surface of tooth—interior of crown and root would often be first attacked.

3: If the disease resulted from this cause, dead teeth would never decay—they are as subject to structural alteration as living teeth—caries must therefore be produced by other cause—inflammation theory incapable of explaining phenomenon.

4. Ancients from time of Hippocrates believed cold to be cause of caries—among writers of present century, one supposed it arose from arrest of circulation in the teeth, occasioned by pressure of organs against each other—hot food regarded by some as cause of the disease—others think it occasioned by use of tea.

5. Endosomatic theory of Lintot, plausible explanation of manner in which acidulated fluids are brought in direct contact with earthy salts of hard dental tissue.

6. Dr. S. K. Mitchell first to detect acid in mouth having stronger affinity for lime of teeth than the phosphoric with which it is combined—mistake with regard to source from whence the acid is derived.

7. Caries of teeth caused for most part by acid secretions of mucous membrane of mouth—secretions of this membrane in normal state, shown by Donne to be acid, and salivary fluids to be alkaline.

8. The structural alteration sometimes due to action of other acids, some resulting from decomposition of remains of alimentary substances lodged between teeth.

9. Drs. L. S. and E. Parmly the first to promulgate distinctly chemical theory of caries in United States—this theory now held by dental pathologists every where.

10. All acids, both vegetable and mineral, act upon hard tissues of a tooth.

11. The *vital* theory of Fox and Bell—the *chemical* theory—the *chemico-vital* and the *endosomatic* theories considered.

## L E C T U R E   X X X I I .

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

1. TEETH sometimes so susceptible to action of chemical agents as to render their preservation almost impossible—if caries be arrested at one point, it may develop itself at another in very few days.

2. Gums and alveoli should be healthy before instituting treatment to arrest progress of caries—remedial indications of softening of dental tissues, filing and filling—former operation first considered.

#### 1. FILING TEETH.

3. Popular prejudice against use of file—operation of great value in treatment of superficial caries of approximal surfaces—when properly performed, disease often permanently arrested—operation should never be entrusted to unskilful hands—does harm when not judiciously executed.

4. Operation sometimes called for preparatory to filling—often the best means of obtaining access to diseased parts of teeth—the most efficacious remedy known in treatment of superficial caries in approximal sides of teeth.

5. Exposure of dentine by removal of enamel with file increases liability of teeth to decay—operation of filing not called for until last named tissue has become seat of structural alteration, and in many instances, former tissue exposed by destruction

of enamel—smooth surface not so liable to retain corrosive agents as irregular diseased surface, and more easily keep clean.

6. Rapidity of decay after dentine has become exposed depends upon physical peculiarities of tissue, and nature of chemical agents in contact with it.

7. Propriety and necessity of operation in many cases—circumstances under which it should be performed—manner of making operation to secure object proposed by it.

8. In separating front teeth, flat safe-sided file best adapted to operation—edges of those last used should be beveled or rounded to prevent leaving sharp-edged projection at base of crown.

9. Aperture should be wider behind than in front, when operation is performed, preparatory to filling—when sufficient portion of tooth is removed, sharp angles should be rounded, and filed surfaces thoroughly polished—this precaution necessary to ensure successful result.

10. In separating molars and bicuspids, V shaped aperture should be formed—pinion and oval-shaped files arranged for file carrier, or having handles bent to avoid injury to commissures of lips should be used.

11. Different kinds of file-carriers—Wescott's most convenient—author's files for molars and bicuspids—various kinds of files used for the purpose.

12. Same precautions used in polishing filed surfaces of molars and bicuspids, as those of incisors and cuspids.

13. Operation completed, dentist should impress upon mind of patient importance of keeping filed surfaces constantly clean—this necessary to prevent recurrence of caries.

14. Manner of holding file—position of operator—file to be frequently dipped in warm water during operation.

## LECTURE XXXIII.

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### DISEASES OF THE TEETH.

#### CARIES—REMEDIAL INDICATIONS OF.

##### 2. FILLING TEETH.

1. PRESERVATION of a tooth, when well filled, so far as part operated on is concerned, considered certain—no operation in dental surgery requiring as much skill and patience on part of dentist as this—the only certain means of arresting progress of deep-seated caries.

2. Important that operation should be performed before structural alteration reaches pulp-cavity—preservation of tooth after lining membrane has become exposed, not positively certain in all cases, still operation may sometimes be successfully performed.

3. Tooth sometimes exquisitely sensitive before caries has penetrated deeply into dentine, but this, as a general rule, should not prevent dentist from removing diseased part and filling cavity—when patient cannot bear pain attending removal of decomposed portion, chloride of zinc may be applied to cavity, using precaution to prevent it from coming in contact with soft tissues of mouth—arsenious acid sometimes employed for this purpose—use of this agent objectionable, except for destruction of vitality of pulp—cobalt supposed by some to be preferable.

4. Indications and counter-indications of operation.

##### 1. MATERIALS EMPLOYED IN OPERATION.

5. Properly prepared gold-foil the best material known for filling teeth—with this, almost any tooth that can be retained in

mouth with impunity and rendered serviceable, can be filled—best foil is free from other metal, beat into thin leaves and thoroughly annealed.

6. Thickness of leaves determined by number of grains in each, and these designated by number marked on book containing the gold—for most fillings, author prefers No. 4, but some dentists use foil varying from four to twenty.

7. Adhesive foil made from crystalline gold or rendered so by annealing immediately before using—circumstances under which adhesive foil can be advantageously used.

8. Crystalline gold possesses adhesive properties, and use of it was, in some cases, before adhesive foil was made, very desirable, but requires more labor to make good filling than with the foil.

9. Chemically pure tin, beat into thin leaves, best material after gold for filling teeth—much used by many dentists—when secretions of mouth very acid, it oxydizes and turns black—author has seen teeth preserved by it thirty years, but for reasons stated, never uses it.

10. Lead formerly much used—this metal more objectionable than tin.

11. Silver and platina foil seldom used for filling teeth—impossible to make thoroughly solid mass with either—they possess less adhesive properties than gold—among other materials employed in operation is alloy of bismuth, tin and lead, called D'Arcets metal—this fusible at temperature of boiling water, and when used, is introduced in cavity in this state—formerly much used, but never at present by good operators—mastic and various preparations of gutta percha often employed for temporary fillings.

12. Amalgam, called by many, mineral cement, and by others, lithodeon, much used by some dentists, but most objectionable of all materials according to author's opinion—effects of it often pernicious.

## LECTURE XXXIV.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

##### 2. FILLING.

#### 2. INSTRUMENTS FOR AND MANNER OF FORMING CAVITY.

1. INSTRUMENTS for removal of caries and shaping cavity, should be so constructed as to be conveniently applied to any part of tooth, and adapted to formation of any sized cavity.

2. Opening cavity in grinding surface of molar burr-drill or broach, well suited to purpose in many cases, in others, small chisel-shaped cutting instrument used more advantageously—flat drills sometimes employed—broach-shaped stem preferable, as it enlarges orifice while cutting away subjacent decomposed dentine with cutting extremity.

3. Drills and broaches sometimes used in socket handle, but more convenient when latter is dispensed with—when this is done, proximal extremity of instrument should rest in socket of shield fixed to ring of fore-finger and extending to palm of hand—shield invented by Dr. Wescott, best in use.

4. Maynard's drill and stock for opening cavities in grinding, posterior approximal and buccal surfaces of molars—can often be used to great advantage—McDowell's drill-stock constructed upon principle of helix lever—Lewis' drill-stock—relative advantages of two last, as compared with other instruments for opening cavities in particular teeth and locations.

5. Excavators—variety of shapes and sizes required—points should have sharp cutting edges, and be well tempered.

6. Formation of cavity for reception of filling important part of operation—bottom and orifice should be very nearly of same size, to enable dentist to make perfectly solid filling, and prevent liability of its loosening.
7. Every particle of decayed and discolored dentine should be removed from walls of cavity—walls of orifice should be sufficiently thick to prevent crumbling of edges.
8. Two or more cavities near to each other, with only thin wall of dentine and enamel between—manner of preparing cavity for filling, that will secure most perfectly, preservation of tooth.
9. In removing caries from central cavity in grinding surface of molar, fissures, if there are any radiating from, should have every particle of discolored enamel and dentine removed, and be deepened and widened sufficiently to admit of being filled as perfectly as central portion of cavity—neglect of this precaution followed by recurrence of disease.
10. Preparatory to removal of caries in approximal surfaces of teeth, access to it to be obtained by filing or separating organs by pressure—circumstances under which the file should be used—pressure preferable when decayed part is surrounded by sound enamel, and does not cover whole of approximal surface.
11. When cavity is very shallow, one or more under cuts necessary to obtain firm hold for retention of gold—same thing required when orifice is considerably larger than bottom of cavity.
12. Manner of preparing tooth preparatory to building on part of crown.
13. Manner of uniting cavity in grinding surface of upper molar with cavity in palatine surface.
14. Preparation of cavity in labial and buccal surfaces of teeth.

## L E C T U R E   X X X V .

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

##### 2. FILLING.

###### 3. INSTRUMENTS FOR AND MANNER OF FILLING A TOOTH.

1. INSTRUMENTS for filling teeth should be strong enough to resist any amount of force the dentist may have occasion to apply in introducing and consolidating the gold—this being the only suitable material for operation.

2. Handles should, for most part, be round or octangular—points of instruments used for introducing the gold, should be flat on two sides, having nearly sharp and serrated extremity—for consolidating the filling, blunt serrated points, varying in diameter from the sixteenth part of an inch to the fortieth or fiftieth part.

3. Instruments both for introducing and consolidating the gold, should vary in shape—some should have straight points—points of others slightly curved, and others again be bent to right angle with stem of instrument—shapes should vary, that the dentist may never be at a loss for such as will enable him to operate with comparative ease on any part of any tooth which requires filling.

4. Filling instruments require to be tempered with great care—temper should neither be too high nor too low—in former case, there would be liability of breaking and wounding mouth of patient, and in the latter, of bending.

5. Gold-foil, preparatory to being introduced into cavity, is cut into narrow strips and made into a long roll or folded—some make the foil into pellets, and others into cylinders before using—relative merits of these different methods.

6. Method of introducing gold prepared in long rolls and folds—each piece should extend from bottom of cavity to sixteenth of an inch outside of orifice—manner of holding instrument and conveying gold on point of to bottom of cavity.

7. Packing the gold against walls of cavity—this done from time to time as operation proceeds—perforating different parts of filling, and introducing gold into cavities thus formed—manner of consolidating extruding portion previous to finishing surface.

8. Introducing filling in grinding surface of molar—in approximal surface of any tooth.

9. Relative position of operator to patient—position of head of patient—precautions necessary in introducing and consolidating gold to prevent liability of wounding mouth by slipping of instruments.

10. Keeping cavity of tooth dry during operation—means employed for this purpose—some awkward and badly adapted to end proposed—operation often retarded by.

11. Finishing surface of filling—importance of to success of operation—manner of doing it.

12. Length of time required to fill a tooth depends on difficulty of operation and situation and size of cavity.

## L E C T U R E   X X X V I .

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

##### 2. FILLING.

##### 4. FILLING INDIVIDUAL CAVITIES IN TEETH.

1. FILLING right approximal surface of left central incisors—gold introduced from behind forwards and upwards—space between this and adjoining tooth, when made with file, should be wider behind than before—by doing this, filling will be out of sight, and ample space afforded for removal of decayed part of tooth and introduction of gold—exceptions to rule when approximal side of tooth is turned slightly forward, and caries situated nearer labial than palatine of organ; also when crowns of teeth incline backwards.

2. When front teeth of upper jaw are separated by pressure, filling can often be best introduced from before.

3. Instrument for introducing gold should be bent to angle of about forty-five degrees, and surfaces of bent point flattened and extremity serrated.

4. The decayed part being removed and cavity properly shaped, end of roll or folded gold is placed in cavity, and fold after fold introduced, pressing each against upper part and walls of cavity until filled, leaving outer ends of folds projecting from orifice—manner of testing and ensuring solidity of filling—condensing and finishing surface—instruments required for and manner of holding them—relative position of dentist to patient during operation.

5. Size of roll or strip of gold required to fill cavity—method of procedure when walls of cavity are very thin and frail; also when teeth have been separated by pressure.

6. Manner of filling right central incisor of upper jaw in left approximal surface, similar to operation last described—different instruments required for and method of manipulating—in what respects relative position of operator and patient differs from that of last operation.

7. Filling cavity in labial surface of incisor or cuspid—manner of forming cavity— instruments required for and method of introducing and consolidating gold—finishing surface of filling—position of patient's head and that of dentist during operation—precautions necessary to prevent instruments from slipping, and to ensure perfect operation.

8. When cavity is shallow, under cut required to hold gold in place—cavity sometimes extends across whole surface of tooth—in this case, different methods of procedure necessary—operation often very difficult, requiring skill and patience to make a good one.

9. Filling cavity in grinding surface of upper molar—when very deep, operation divided into two parts—upper half or two-thirds is first thoroughly filled—remaining portion then filled with vertical folds of gold made into rolls or folded— instruments required for and manner of introducing, consolidating and finishing surface of filling.

10. Different methods of procedure in filling cavity in grinding surface of upper molar on right and left side of mouth— instruments required for are not adapted for all other cavities—relative position of operator and patient different.

11. Filling cavity in anterior approximal surface of right upper molar or bicuspид— instruments required for and manner of introducing and consolidating gold—part of cavity most liable to be imperfectly filled—precautions to be observed in conducting operation—position of head of patient and left hand of operator.

## LECTURE XXXVII.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

##### 2. FILLING.

#### 4. FILLING INDIVIDUAL CAVITIES IN TEETH—CONTINUED.

1. CAVITY in posterior approximal surface of upper bicuspid on either side of mouth as easily filled as one in anterior surface—position of left hand nearly same in one case as the other—first folds of gold placed against palatine and upper walls of cavity—introduction of gold at bucco-coronal angle—details of other parts of operation.

2. Filling cavity in posterior approximal surface of first or second upper molar, when mouth of patient is large, as easy as operation last described—methods of procedure for each side of mouth—manner of retracting commissure of lips—precautions to be observed to prevent slipping of instruments.

3. Filling cavity in buccal surface of upper bicuspid or molar—manner of introducing and consolidating gold—finishing surface of filling—consolidating forceps useful in some cases—method of procedure somewhat different on one side of mouth from that of other.

4. Introducing and consolidating gold in cavity of palatine surface of upper molar—operation sometimes very difficult—details of manipulations required.

5. Filling cavities in grinding surface of upper united with cavity in palatine surface—manner of conducting operation.

6. Filling lower incisor or cuspid more difficult than operation on corresponding teeth of upper jaw—constant tendency of lower jaw to move, embarrassing to dentists.

7. When caries is in approximal surface, access to it obtained by separating teeth with file, or by pressure—latter method preferable, as operation of filling in most cases has to be performed from labial instead of lingual surfaces, and to obtain sufficient space by former, would seriously disfigure organs.

8. Method of filling cavity in right approximal surface of lower incisor or cuspid—position of patient's head, manner of holding lower jaw and depressing lower lips—introduction and consolidation of gold—finishing surface of filling—position of operator and precautions to be observed in use of instruments.

9. Filling cavity in left approximal surface of same tooth—method of procedure similar to that of operation in right side—differences described.

10. Manner of filling cavity in labial surface of lower incisor or cuspid—introduction and consolidation of gold—instrument employed in making operation.

11. Filling cavity in grinding surface of lower molar—instruments for and manner of introducing and consolidating gold—position of operator and manner of supporting jaw—differences in method of procedure in operating on tooth in right and left sides of mouth.

12. Method of introducing and consolidating gold in cavity in anterior and posterior approximal surface of lower molar or bicuspid, on right or left side of jaw—instruments required to make operation—position of dentist to patient, and precautions against slipping of instrument.

13. Filling cavity in buccal or lingual surface of lower molar or bicuspid—method of conducting operation.

14. Filling cavities in parts of teeth, not designated.

## LECTURE XXXVIII.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF. 2. FILLING OVER EXPOSED NERVOUS PULP.

1. PRACTICABILITY of filling tooth after lining membrane has become exposed so as to preserve vitality of organ, doubted by many—Dr. Koecker first to recommend operation, and to demonstrate that it could be successfully performed in large majority of cases—importance of preservation of vitality of nervous pulp to usefulness of tooth.

2. Author has been in habit of performing operation regularly since 1846—first time he attempted was in 1834—at first not uniformly successful, but more so as he acquired experience.

3. Gold must not be placed directly on exposed pulp—vacant space in bottom of cavity, if not filled by operation of economy, would cause inflammation of soft tissues in central chamber of tooth—this filled by effusion of lymph, and its conversion into *callus* and *osteo-dentine*—Drs. Harwood, Foster, and Dwinell's opinion with regard to change that takes place after performance of operation.

4. When vacant space between filling and pulp fails to be filled, inflammation and suppuration of latter takes place—alveolar abscess then forms, and tooth, if permitted to remain in mouth, acts as morbid irritant.

5. Circumstances under which operation may be successfully performed—should not be attempted in unfavorable cases—condi-

tion of tooth and health and temperament of patient determine result of operation.

6. Method of procedure pursued by Dr. Koecker—first removes caries and shapes cavity, freeing exposed pulp from dust with raw cotton moistened in warm water—if lining membrane is not wounded, covers pulp with thin piece of sheet lead, then fills in usual way—when lining membrane is wounded cauterizes with iron wire heated to red heat, and when hemorrhage has subsided, wipes cavity, covers nerve with sheet lead and fills.

7. Dr. Foster places gold cap over nerve filled with Hill's stopping, before introducing gold—sometimes fills entire cavity with Hill's stopping, and at end of five or six months, replaces it with gold—has removed filling put in over exposed nerve, and found unyielding bone beneath, void of sensibility.

8. Author never applies cap over exposed pulp before filling—introduces gold in vertical folds, using precaution not to touch pulp with inner extremities, pressing them firmly against walls of cavity as he proceeds with operation—this properly done, extruding portion may be consolidated without fear of impinging on pulp within.

9. Results of cases treated by author in five years—causes of the unsuccessful results.

10. Relative success of operation under most favorable circumstances.

## LECTURE XXXIX.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

#### 3. FILLING PULP-CAVITY AND ROOT OF TOOTH.

1. VALUE of operation—objection to it founded upon idea that after tooth has lost its vitality it acts as irritant, and cannot be retained in mouth without injury to health of surrounding living parts—cementum does not lose vitality with death of pulp, and this often prevents necrosed dentine from exerting morbid effects upon system,—putrid matter contained in cavity of tooth—cause of diseased action set up in socket of dead tooth.

2. Dr. Maynard, of Washington, among the first to demonstrate practicability of saving tooth and rendering it serviceable after death of pulp, by filling central chamber to extremity of root.

3. Success of operation, as shown by report of forty cases treated by Dr. Foster, of New York—teeth preserved in thirty-eight of the cases—alveolar abscess occurred in eight—disease of sockets not so great as to render removal of teeth necessary.

4. Operation successful when pulp is extirpated with instrument or destroyed by application of escorotic and then removed to extremity of root, than when destroyed by disorganizing process of inflammation—in latter case, peridentum at end of root is involved in diseased action and secretes purulent matter so that if pulp-cavity is filled, escape of this through tooth is prevented, and irritation produced by it gives rise to alveolar abscess.

5. Necessary to cure ulceration at extremity of root before filling tooth—remedial agents which have been found most successful—creosote and nitrate of silver—manner of applying them to ulcerated surface.

6. Manner of extirpating pulp previous to destruction of vitality—escorotics used for destroying vitality of pulp and manner of removing it after destroyed—Dr. Maynard's method of procedure.

7. After removing pulp, hemorrhage should subside before filling is introduced—when there is no bleeding, operation may be performed at once.

8. Method pursued by different operators in filling root—difficulty sometimes experienced in this part of operation—sometimes necessary to cut away fourth or third of crown of tooth to obtain convenient access to central chamber—there are many cases in which this can only be done by making large opening in grinding surface.

9. Filling roots of lower molars often more difficult than those of upper—importance of filling each one to extremity.

10. Operation more tedious and difficult when crown cavity is in posterior approximal surface.

## L E C T U R E X L.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

#### 4. FILLING TEETH WITH CRYSTALIZING GOLD & ADHESIVE FOIL.

1. Two preparations of spongy gold used for filling teeth—one of crystalline texture, the other composed of small granular particles, both having adhesive properties, and capable of being reduced into a solid mass—crystalline preferable to granular.

2. Spongy gold useful for building on portions of crowns of teeth—cannot be worked as easily as leaf gold—durable filling made by welding particle to particle throughout the entire mass.

3. Instruments required for use of spongy gold, different from those employed in filling teeth with foil—employment of it also requires different system of manipulation.

4. Working extremities of instruments used for filling teeth with spongy gold, should be sharply denticulated, varying in size from eighth of an inch down to nearly a sharp point—some required for conveying the gold to the cavity in tooth, and others for consolidating it—carrying instruments have round and oval-shaped points, the carrying surface denticulated, the other smooth, and bent to various angles.

5. Spongy gold, before using, is cut into small pieces, varying in size according to dimensions of cavity to be filled—each little mass or piece, after being placed in cavity, is thoroughly consolidated, and thus operation proceeds, until this part is completed, using the precaution to keep gold free from moisture, as this prevents union of its particles.

## L E C T U R E X L I.

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### DISEASES OF THE TEETH.

#### 2. CARIES—REMEDIAL INDICATIONS OF.

##### 5. BUILDING ON THE WHOLE OR PART OF CROWN OF A TOOTH.

1. PERFORMANCE of this operation tedious and often very difficult, requiring for its accomplishment from three to twelve hours labor—can only be done by most skilful operators.

2. Operation to be successful, must be executed from beginning to end in the most perfect manner—the remains of tooth must also be situated in perfectly healthy socket, and firmly articulated.

3. When pulp of tooth is exposed, this first destroyed and removed to extremity of roots—canal in this is filled with gold-foil, and if no walls to tooth capable of affording support to gold, pulp-cavity is enlarged and undercut made in inside of walls.

4. Pulp-cavity and undercut first filled, covering exposed edge of wall with gold welded to that within central part of tooth—adhesive foil properly prepared, or spongy gold cut into small masses is then built on and consolidated as the operation proceeds, until lost portion of organ is replaced, adding sufficient gold to enable operator to give to filling the shape of lost part of tooth.

5. Method of procedure when moisture comes in contact with the gold before operation of building on is completed.

6. Shaping the surface of the gold—instruments required for and manner of finishing the operation.

7. Upper teeth more easily operated on than lower—dentist not so liable to be embarrassed by contact of salivary and mucous secretions of mouth.

## LECTURE XLII.

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### DISEASES OF THE TEETH.

#### 3. ODONTALGIA—(TOOTH-ACHE.)

1. TOOTH-ACHE not strictly a disease, but merely symptom of variety of morbid phenomena of affected part, still the most prominent feature of the affections with which it is connected.

2. The pain unlike any other kind of pain—varies in degree, character and duration—passes through every grade from slight uneasiness to insupportable torture—is *dull, heavy, aching, pungent, sharp, grinding, throbbing, lancinating, shooting* like electric flash from affected tooth to every part of jaws and face.

3. Pain sometimes continued, but oftener paroxysmal—sometimes remittent or intermittent—is both regular and irregular in its attacks—sometimes comes on in flashes and as suddenly subsides—sometimes confined to tooth which is seat of the disease; at other times in corresponding opposite tooth,—again it passes from tooth to tooth, until all in jaw are affected—impossible to describe various grades and degrees of suffering it occasions.

4. Immediate or proximate cause in majority of cases irritation or inflammation of lining or alveolar membrane or of nervous pulp—sometimes arises as consequence of transfer of nervous irritation—as in cases of derangement of digestive organs—females during gestation peculiarly subject to it—it sometimes occurs among persons living in miasmatic districts, when dental tissues almost sound, assuming intermittent form, the paroxysms coming on every other day or every day.

5. Tooth-ache arising from inflammation of dental tissues usually termed inflammatory—the pain often confounded with other neuralgic affections—*tic douloureux* caused in most cases by dental irritation—the nerve of only one tooth or the trunk supplying all the teeth may be associated in the morbid action.

6. Explanation of causes of tooth-ache given by Dr. Good—different varieties of the affection and various causes producing it.

7. Tooth-ache occasioned by contact of mechanical or other irritating agent with exposed pulp often relieved by application of creosote, chloroform, or some stimulating, pungent preparation, as saturated alcoholic solution of tannic acid and gum benzoin—essential oils often used successfully—sul. ether, camphor and alum very efficacious remedy—the destruction of the vitality of nervous pulp with arseneous acid a very popular and common remedy.

8. Tooth-ache resulting from gastric derangement often yields to emetic or cathartic—when from irritability of general system, such constitutional treatment as indicated by nature of disturbance should be prescribed.

9. In treatment of tooth-ache dependent upon constitutional disturbance, remedies should be addressed to general system.

10. Extraction of aching tooth often necessary—circumstances under which operation should be performed.

## LECTURE XLIII.

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### DISEASES OF THE TEETH.

#### EXTRACTION OF TEETH.

1. ACCIDENTS sometimes occur when operation is unskillfully performed—case of removal of large portion of upper jaw in attempt to extract second molar reported by Dr. Fitch—similar case described to author by Dr. Cross, of North Carolina—many cases of fracture of maxillary bone have also come to his knowledge—wrong teeth sometimes removed.

#### INDICATIONS FOR OPERATION.

2. Extraction of temporary tooth indicated when replacing organ has come through either in front or behind it, and in some cases when it is about to emerge from gum; also, when aperture formed by loss of first tooth is too narrow to admit permanent—alveolar abscess and necrosis of socket of temporary.

3. When permanent molar, from loss of antagonizing teeth, has become partially displaced and is source of constant irritation, its removal indicated—also, when purulent matter is discharged through decayed opening in crown from pulp-cavity or through fistulous opening in gum when disease at extremity of root cannot be cured—irregularity arising from disproportion between size of teeth and alveolar arch another indication calling for removal of one or more teeth.

4. Dead teeth and roots of teeth so much loosened from destruction of their sockets as to be a constant source of disease to adjacent tissues or of constitutional disturbance should,

as a general rule, be extracted—other indications for performance of operation.

#### INSTRUMENTS EMPLOYED IN OPERATION.

5. The key of *Garengeot*—principle upon which it acts—teeth for the extraction of which it is applicable—the construction of the bolster, claws, shaft or axle and handle varied to suit the peculiar notions of different operators.

6. Forceps not generally employed until about 1830—when first used subsequently to invention of the key, they were awkwardly constructed and illy adapted to extraction of molar and bicuspid teeth.

7. Important that forceps should be accurately fitted to the teeth for extraction of which they are designed—the number required for the removal of the several classes of teeth.

8. Forceps for extraction of upper and lower molars designed by Mr. Snell best in use at time of their invention—jaws of these fitted to crowns and necks of teeth—hook at extremity of one of the handles to prevent hand from slipping.

9. Lower molar forceps as improved by author supersedes necessity of more than one instrument, and enables operator to support patient's head and apply extraction force to greater advantage than can be done with any other instrument.

10. Forceps for removal of upper molars—two pair required—construction of, as improved by author.

11. Upper and lower incisor forceps—their construction.

12. Forceps for extraction of upper and lower bicuspids.

13. Forceps for extraction of upper dentes sapientiae invented by Dr. Ed. P. Church—forceps for extraction of lower dentes sapientiae.

14. Narrow beaked forceps for extraction of roots of teeth.

15. Maynard's forceps; Hullihen's compound screw forceps.

16. Hook, punch, conical screw, and elevator for extraction of roots of teeth.

## LECTURE XLIV.

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### DISEASES OF THE TEETH.

#### MANNER OF EXTRACTING TEETH AND ROOTS.

1. In the extraction of upper incisors, the gum first separated from neck of tooth with thin straight bladed lancet, having sharp point, to edge of alveolus; tooth then grasped between the jaws of straight forceps, high up under edge of gum, and then by means of rotary motion and direct extraction force removed—difficulties sometimes experienced when crown of tooth is badly decayed, and method of procedure required to overcome them.

2. Lower incisor removed by very similar method of procedure—operation requires narrow beaked forceps, bent to angle of about thirty degrees.

3. In extraction of cuspids either from upper or lower jaw, more force is required—same forceps may be used, and same system of manipulation pursued—the roots not being as round as those of the incisors, admits of being rotated in socket but little—in consequence of which, more direct force is required.

4. Upper molars having three roots, more force is required to extract them than for removal of incisor or cupid—manner of grasping tooth after having separated gum, and applying force for its removal—position of operator, and manner of confining patient's head—precautions to be observed in operation.

5. Method of procedure in extracting *dens sapientiae* of upper jaw—this tooth not as firmly articulated as first or second molar, and requires less extractive force for its removal—when mouth of patient is very small, difficulty sometimes experienced in applying forceps to it.

6. Lower molars often very firmly articulated—in manner of extraction—position of operator, and precautions to be observed in operation.

7. Extraction of dens sapientiae of lower jaw—operation often very difficult—space between coronoid process and second molar so narrow that tooth has assumed abnormal position—grinding surface of former in contact with posterior approximal surface of crown of latter—method of procedure under such circumstances.

8. When molar tooth, whether of upper or lower jaw, is closely wedged between other teeth, operation will be rendered easier by passing file between it and one of the adjoining organs before extraction.

9. Method of procedure when approximal side of tooth has lost considerable of its substance, and adjoining organs have impinged upon it.

10. Manner of extracting bicuspid, whether of upper or lower jaw, or on right or left side of mouth.

#### EXTRACTION OF ROOTS OF TEETH.

11. Manner of extracting root of upper incisor or cuspid when funneled out too much to sustain grasp of forceps—manner of using conical screw and compound screw forceps—last mentioned instrument the best.

12. Manner of using the hook, punch and elevator in extraction of root of bicuspid or molar, whether of upper or lower jaw—narrow beaked forceps preferable in most cases to any of these instruments.

13. Manner of using forceps for cutting walls of alveolus of root of bicuspid, when it cannot be grasped above it.

14. Manner of using Maynard's forceps in extraction of roots of upper molars.

## LECTURE XLV.

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### DISEASES OF THE TEETH.

#### USE OF ANÆSTHETIC AGENTS IN EXTRACTION OF TEETH— HEMORRHAGE AFTER THE OPERATION.

1. SULPHURIC ether and chloroform most successful anæsthetic agents that have been employed—practicability of abolishing pain of surgical operations, first fully demonstrated and made known to medical and dental professions in 1846, by Dr. W. G. S. Morton, dentist of Boston—first named agent the one employed by Dr. M.—inhalation of vapor of, the manner of administering—Professor Sympson, of Edinburgh, Scotland; the first to use chloroform for purpose of producing anæsthesia—successful experiments made by Professor S. with last named agent in 1847.

2. Chloroform more prompt and certain in its effects than ether—also, more dangerous—use of it has proved fatal in hundreds of cases—death has occasionally resulted from inhalation of vapor of ether.

3. Neither agent should be administered to individual laboring under disease of heart, brain or lungs—physician or dentist therefore should be well assured before giving ether or chloroform, that these organs are free from disease, and from all proclivity to disease.

4. Great number of inhalation instruments invented for administration of above named agents—the best method is to inhale them from napkin, pocket handkerchief or hollow sponge.

5. Danger from inhalation of ether or chloroform supposed to be diminished by patient occupying reclining posture.

6. Above agents too powerful and dangerous in their effects to justify their use in so simple an operation as extraction of a tooth.

7. Local anaesthesia produced by congelation or freezing, recommended by Dr. Arnott of London—this effected by applying mixture of pounded ice and common salt, in the proportion of two or three parts of former to one of latter, to the part to be operated on.

8. Care required in use of last named anaesthetic agent—danger arising from reducing temperature too low—instruments for application of the mixture to tooth, preparatory to extraction—the best in United States invented by Dr. Branch, of Chicago, Illinois—manner of using it.

9. Instrument for graduating the reduction of temperature to any given point, invented by Messrs. Horne and Thornthwaite, opticians of London, at suggestion of Mr. Blundell, dentist—supposed advantages of this over other instruments employed for application of freezing mixture.

10. Anaesthesia applied to the extraction of teeth produced by passing electro-galvanic current through tooth at the moment of removal—the discovery made by Mr. J. B. Francis, dentist, of Philadelphia—the effect not certain in all cases.

11. Use of anaesthesia in extraction of teeth, attended with inconvenience, and usually procrastinates operation.

#### HEMORRHAGE AFTER EXTRACTION OF TEETH.

12. Hemorrhage rarely excessive after extraction of teeth, except in individuals of cachectic habit of body, or in whom there is hemorrhagic diathesis—cases which have come under observation of author.

13. Manner of arresting hemorrhage—means employed, local and constitutional.

## LECTURE XLVI.

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### DISEASES OF THE TEETH.

#### ODONTATROPHIA—(ATROPHY OF THE TEETH.)

1. ATROPHY of the teeth, a structural alteration, affecting sometimes only one, and at other times two of the hard tissues, the enamel and dentine—the affection not of common occurrence, neither its ætiology nor pathology very well understood—peculiarities of its several varieties not described by writers on diseases of the teeth.

2. The affection, in two of its varieties, a congenital defect, not wasting from want of nourishment, as the designation applied to it implies—the defect occurs previous to eruption of the organs—except in one variety—that sometimes occurs subsequently.

3. Mr. Fox refers defects under consideration to deviation from natural action of membrane, which he supposed secreted enamel, arising from constitutional peculiarities during first months of infancy—same writer thinks several children of same family liable to it.

4. One variety confounded by M. Delabarre with erosion, an entirely different affection—the term atrophy restricted by last named writer to discolouration and absence of portion of enamel—these attributed to vicious development or imperfect nutrition of exhalents supposed to secrete enamel fibres—views of this writer adopted by Lefoulon.

5. Description of affection as given by Maury, nearer correct than that of any other writer—none of the varieties the result of action of corrosive agents—hence the term erosion not applicable.

6. There are three distinct varieties of odontotrophia—peculiarities of each different from either of the others—two always congenital—the other sometimes accidental, but more frequently congenital.

7. First never affects uniformity and smoothness of enamel—is characterized by one or more white, yellow, dark or light brown spots, of irregular shape, on labial or buccal surface of tooth—rarely more than one tooth affected—this variety sometimes occurs subsequently to eruption of tooth—the spots of variable size.

8. The second variety characterized by a row of irregular depressions, extending transversely across and around the tooth, giving it a sort of quilted appearance—this variety always congenital, and affects two or more corresponding teeth of each jaw—distinguished from erosion by walls of each pit or depression being smooth and presenting glossy appearance.

9. Third variety implicates dentine as well as enamel—the affected tooth has pale yellow aspect and shriveled appearance—the affection always congenital, and increases susceptibility of tooth to action of corrosive agents—two teeth usually, and sometimes four affected by it.

10. Causes of first variety of the affection, destruction of intermediary membrane between enamel and dentine—of the second, eruptive disease during formation of enamel, and of the third, constitutional disease at time of formation of last mentioned tissue.

11. Observations of author during practice of thirty years.

## LECTURE XLVII.

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### DISEASES OF THE TEETH.

#### 5. EXODONTOSIS—(EXOSTOSIS OF THE TEETH.)

1. ALL the osseous tissues of the body liable to become the seat of exostosis, but the root is the only part of a tooth subject to attacks of the disease—commencing at or near the extremity, it usually extends over large portion of its surface—sometimes confined to apex on one side, and deposit of earthy salt goes on until large tubercle of regular or irregular form is developed.

2. The new formation usually of color and consistence of cementum—assumes sometimes yellower tinge and firmer consistence—the morbid growth a mere hypertrophid condition of last mentioned tissue.

3. Morbid growth sometimes goes on until tumor, the size of large filbert, is formed—roots of two and occasionally of three teeth united by it—several examples of the kind in Museum of this Institution—two cases of extraordinarily large tumor on posterior surface of root and neck of lower dens sapientiae.

4. Enlargement of roots of teeth source of local irritation and sometimes of constitutional disturbance—numerous examples have come under observation of author—one had caused disease of maxillary sinews—another occasioned so much suffering as to render extraction of nearly all the teeth necessary—most remarkable case of exodontosis on record related by Mr. Fox—local and constitutional symptoms so alarming that it became necessary to remove every tooth in mouth.

5. Disease sometimes continues long time without making much progress or causing serious inconvenience to patient, the enlargement of alveolus keeping pace with the deposition of osseous matter upon root.

6. Roots of sound as well as those of decayed teeth subject to enlargement—it occurs however more frequently on the latter than the former.

7. Difference of opinion with regard to cause of exodontosis—supposed by some to be result of disease in crown—this opinion shown to be erroneous by fact that it occurs in teeth where no structural alteration has taken place—it undoubtedly arises as a consequence of local irritation favored by peculiar constitutional idiosyncracy—sound tooth may be productive of irritation, and when this is the case in individuals having proclivity to the disease, hypertrophy of cementum may take place.

8. Diagnosis very obscure—existence of the disease only inferred from symptoms.

9. Treatment of exodontosis after disease has made considerable progress consists in extraction of the painful teeth.

## LECTURE XLVIII.

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### DISEASES OF THE TEETH.

#### 6. NECROSIS: 7. SPINA VENTOSA.

##### 1. NECROSIS.

1. NECROSIS as applied to a tooth has reference to death of dentinal portion of organ—vitality of the cementum often continues after destruction of that of first named tissue—the latter derives living principle from investing membrane of root—the former from lining membrane.

2. Density of a tooth not manifestly affected by loss of vitality of dentine—appearance of organ so changed by it as to be very apparent to most common observer—has not the peculiar semi-translucent aspect of living tooth, but has muddy or dingy brown color.

3. The change of color occasioned by loss of vitality is greater in teeth of soft texture than those of hard—discoloration greater when death of pulp has been occasioned by a blow than by the more gradual process of inflammation and suppuration.

4. After death of pulp, tooth may receive sufficient vitality from peridental membrane to prevent it from acting as morbid irritant to socket and surrounding living tissues—teeth often retained in mouth for years after death of dentine—important in such cases that central chamber be obliterated to extremity of coat.

5. Necrosis of dentinal part of tooth, when not occasioned by a blow sufficiently severe to sever nervous and vascular cord, is caused by inflammation and suppuration of pulp—spontaneous disorganization of pulp sometimes takes place.

6. When necrosed tooth is source of irritation to surrounding tissues, extraction constitutes proper remedial indication.

## 2. SPINA VENTOSA.

7. The term spina ventosa not strictly applicable to affection designated by that name as applied to bone—it signifies tumor caused by internal caries, attended by prickling sensation of surrounding soft tissues—the name given by Mr. Fox to diseased condition of lining membrane attended by enlargement of canal in root and hypertrophy of cementum.

8. During progress of disease, the gum inflames and swells—purulent matter escapes from alveolus through it by several openings—this, the effect of alveolar abscess preceded by inflammation and suppuration of lining membrane.

9. Enlargement of canal of root not caused by absorption, but by corrosive matter formed in it.

10. Proper remedial indication of disease is extraction of affected tooth.

## LECTURE XLI.

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### DISEASES OF THE TEETH.

9. SPONTANEOUS WASTING OF THE LABIAL AND BUCCAL SURFACE OF THE TEETH.
10. SPONTANEOUS ABRASION OF THE CUTTING EDGES OF THE INCISOR AND CUSPID TEETH.
1. WASTING OF THE LABIAL AND BUCCAL SURFACES OF TEETH.

1. GRADUAL wasting of enamel of labial and buccal surfaces of teeth, one of the most singular affections to which these organs are liable—commences on central incisors, then attacks laterals, cuspids and bicuspids, and sometimes first and second molars, forming horizontal groove with smooth regular walls.

2. Excavation after cutting through enamel, enters subjacent dentine, penetrating sometimes to pulp-cavity—teeth first attacked always affected most by destructive process.

3. Color of enamel rarely changed—dentine, after becoming exposed, assumes first, light and afterwards dark brown color.

4. Destructive process sometimes commences at a single point; at other times several are simultaneously attacked—as the affection progress, these unite, forming irregular excavation, having smooth and apparently polished walls.

5. Progress of the affection variable; sometimes so rapid that dentine becomes exposed in one or two years; at other times not for six or eight years—remarkable example of it came under observation of author.

6. Authors not agreed with regard to cause—opinions of Hunter, Fox and Bell concerning it—it is evidently the result of action

of chemical agents—case related by Dr. E. Parmly where human teeth used as artificial were affected by this peculiar destructive process.

7. Remedial indications.
2. SPONTANEOUS ABRASION OF CUTTING EDGES OF FRONT TEETH.

8. This affection much rarer than wasting of labial surfaces of teeth—central incisors first attacked, destructive process then extends to laterals, cuspids and bicuspids—progress of the affection exceedingly variable—sometimes proceeds rapidly; at other times very slowly.

9. It gives to the teeth the appearance of having been accurately filed down and polished—as the abrasion progresses, the cutting edges of upper and lower incisors are separated more and more from each other—author has seen a case in which two-thirds of crowns of central incisors had been destroyed—remarkable and interesting case described by Mr. Thos. Bell.

10. Only inconvenience occasioned by spontaneous abrasion is increase of susceptibility of teeth to impressions of heat and cold, and to action of acids.

11. The loss of substance supposed by author to be occasioned by action of acid secreted by end of tongue.

12. Remedial indications.

## LECTURE L.

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### DISEASES OF THE TEETH.

#### 11. IRRITATION, INFLAMMATION AND ULCERATION OF THE DENTAL PULP.

1. EXQUISITE sensibility of pulp of tooth—its liability to become seat of various morbid phenomena—susceptibility of the tissue to morbid impressions influenced by temperament, habit of body and state of general health.
2. Pulp often assumes preternatural susceptibility to impressions of heat and cold and acids, where caries has penetrated nearly to central chamber—also in females during gestation.
3. With heightened irritability of pulp, is the liability of the tissues to become the seat of inflammation increased.
4. Impressions of heat and cold communicated to pulp through conducting medium of metallic filling a source of irritation and sometimes of inflammation and suppuration—means employed by nature to prevent these phenomena consist in conversion of affected part of pulp into secondary dentine, or in effusion of plastic lymph and the formation of a protective covering of ostiodentine over it.
5. Last mentioned operations of economy no proof that hard tissues of a tooth are endowed with recuperative powers, nor do the two or three isolated cases of supposed union of fractured surface of teeth establish the fact—the reparative process always affected through the agency of the lining membrane and pulp—numerous examples of this kind have come under observation cf author.

6. Irritation or slight increase of vascular action necessary to formation of secondary dentine, or deposition of earthy salts in tissue of affected part, or to effusion of plastic lymph—supervention of active inflammation prevents these protective and reparative operations of the economy.

7. Acute inflammation of dental pulp usually, but not always, terminates in suppuration—this tissue, when free from inflammatory action, has greyish-white color—when inflamed is red, and its capillary vessels may be distinctly seen—symptoms of active inflammation, deep-seated, severe throbbing pain, often attended with constitutional disturbance of more or less aggravated character.

8. When pulp of tooth is exposed by caries of the hard tissues, it frequently becomes the seat of chronic inflammation and pain of a more or less severe character, whenever touched by irritating agents—tooth-ache thus produced, usually relieved by stimulating and pungent applications.

9. Pulp of tooth sometimes becomes the seat of ulceration—progress and symptoms of the disease.

## LECTURE LI.

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### DISEASES OF THE TEETH.

#### 11. IRRITATION, INFLAMMATION AND ULCERATION OF THE DENTAL PULP—CONTINUED.

1. PAIN produced by impressions of heat and cold conveyed through conducting medium of metallic filling is in proportion to sensibility of the dentine between it and the pulp—pain prevented by destroying or obtunding sensibility of dentine at bottom of cavity, or placing non-conducting substance over it before introducing filling—asbestos, cork, oiled silk and gutta percha, agents employed for last mentioned purpose.

2. Removing sensibility of dentine before filling cavity in tooth—arseneous acid, cobalt and chloride of zinc, the agents usually employed—danger of destroying vitality of pulp by use of either of the two first—last mentioned agent may be used with safety and in majority of cases with success—actual cautery recommended by some French writers—use of this agent long since laid aside by English and American dentists.

3. Arseneous acid seldom used except for destroying vitality of pulp—active properties of cobalt due to the arsenic it contains, but the quantity in it being small, the effect is less prompt and not so liable to reach the pulp—time required for first named agent to obtund sensibility of dentine, from two to three hours—five or six hours required when cobalt is used.

4. Sensibility of dentine destroyed by chloride of zinc in from three to five minutes—when used, applied directly to cavity

of tooth, covered with raw cotton and held in place by operator until desired effect is produced.

5. When non-conducting substance is used, it is placed in bottom of cavity previously to introduction of gold—gutta percha preferable to cork, oiled silk or asbestos.

6. When chloride of zinc is employed, as much of decomposed dentine as possible should be removed before it is applied.

7. Astringents, as nut galls, tunic acid, &c., also used to allay sensibility of dentine—their use not been attended with sufficient success to entitle them to confidence.

8. Method of applying non-conducting substance adopted by Dr. Foster, of New York.

9. Irritability of pulp sometimes dependent on other causes than impressions of heat and cold—contact of decomposed dentine or other irritant with pulp produces same effect—sometimes owing to altered function of some other part of body.

## LECTURE LII.

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### DISEASES OF THE TEETH.

#### 11. IRRITATION, INFLAMMATION AND ULCERATION OF THE DENTAL PULP—CONTINUED.

1. INTRACTABLE character of inflammation of pulp of a tooth—progress usually very rapid and termination almost always destructive of vitality of the tissue—its exquisite sensibility renders contact of mechanical or other irritant source of severest pain—when inflamed, its capillaries become injected and press upon the nerves every where distributed throughout its substance—this aggravates existing disease and causes intense suffering to patient.

2. Physical and vital peculiarities, as well as situation of dental pulp, accounts for fact that acute inflammation usually terminates in disorganization of the tissue.

3. Treatment to be effective in arresting progress of disease, must be prompt removal of local and exciting causes—when produced by pressure of filling, removal of this and application of leeches to gum of affected tooth, constitutes first remedial indication—blood letting from arm and saline cathartic, if patient be of full habit, often serviceable.

4. When disorganization of pulp has taken place, opening should be made into central chamber of tooth for escape of pus—formation of alveolar abscess and sometimes destruction of entire tissue prevented, when this is done immediately after suppuration has taken place—part of pulp sometimes saved and restored to health.

5. Irritability of pulp may be so much increased, several months after tooth has been filled, by change in patient's general health, that impressions of heat and cold may give rise to inflammation—when this happens, filling should be immediately removed, and when inflammation subsides, tooth refilled with layer of Hill's stopping in bottom of cavity.

6. Perforation of neck of tooth with drill, and puncture of pulp with sharp pointed instrument for escape of effused lymph, recommended in treatment of inflamed pulp—operation not successful.

7. When retention of tooth is not a matter of great importance, extraction the proper remedy.

8. Chronic inflammation of pulp restricted to exposed surface—means employed by economy for removal of the disease—efforts of nature when properly assisted by art, sometimes successful—remedial indications.

9. Ulceration of the pulp sometimes treated successfully with mild escharotics—manner of applying them—indications expected to be fulfilled by their use—treatment recommended by Drs. Dwinille and Codman—exclusion of air and foreign matter from cavity of tooth necessary.

## LECTURE LIII.

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### DISEASES OF THE TEETH.

12. SPONTANEOUS DISORGANIZATION OF THE PULP OF A TOOTH.
13. FUNGOUS GROWTH —14. OSSIFICATION.

#### 1. SPONTANEOUS DISORGANIZATION.

1. SPONTANEOUS destruction of pulp very rare affection—wholly overlooked by writers on diseases of teeth—disorganization effected so insidiously that disease is not suspected until the teeth lose their natural appearance and assume blueish brown or muddy aspect—death of pulp not preceded by pain or any symptoms of inflammation—apparently caused by suspension of nutritive function of the tissue.

2. Sockets of the teeth not affected by death of pulp—this possibly owing to diminished excitability of alveolo-dental periosteum and innoxious nature of disorganized tissue in central chamber of tooth—gums covering alveoli of affected teeth assume pale greyish purple appearance, but exhibit no other indications of disease—margins are thin and distinctly festooned.

3. When crown of affected tooth is perforated a drop of dark brown, inodorous matter, of the consistence of cream, escapes from opening.

4. Death of pulp, according to observations of author, takes place between fifteenth and twentieth years of age, and occurs in two or more corresponding teeth simultaneously—first case that attracted his attention, pulps of six teeth had perished.

5. Loss of vitality seems to be dependent upon some peculiar cachetic habit of body in which function of sanguification is imperfectly performed.

6. Remedial indications same as necrosis from inflammation and suppuration of lining membrane and pulp.

## 2. FUNGOUS GROWTH.

7. Pulp of a tooth sometimes becomes seat of small vascular tumor almost as sensitive as its own tissue, rarely exceeding the size of small squirrel shot.

8. Fungous tumors often develop themselves in central cavity of tooth, exposed from decay of the crown, having their origin in alveolo-dental periosteum or gum—these frequently mistaken for morbid growth of pulp—latter less sensitive than former, and bleed profusely from slightest injury.

9. Remedial indication in either case consists in removal of tooth—tumor, if extirpated, will be immediately reproduced.

## 3. OSSIFICATION.

10. Ossification of the whole or part of pulp of a tooth—means sometimes employed by nature to prevent consequences of exposure of this exquisitely sensitive tissue—it sometimes takes place in teeth that have suffered no loss of substance—result in either case of irritation—this sometimes produced by impressions of heat and cold conveyed through thin covering of dentine or metallic filling; at other times it results from constitutional causes.

11. During ossification, sensation occasionally experienced similar to that attending the union of fractured extremities of broken bone—this occurs several times a day, but lasting only second or two at a time—occasions but little annoyance to patient.

12. Effect of ossification of pulp upon appearance of tooth.

## LECTURE LIV.

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### DISEASES OF THE TEETH.

#### 15. INFLAMMATION OF THE PERIDENTEUM—MECHANICAL ABRASION OF THE TEETH.

##### 1. INFLAMMATION OF PERIDENTEUM.

1. INFLAMMATION of the peridenteum, whether acute or chronic, is modified by state of constitutional health of patient and the causes that produce it—alveolar abscess the usual termination of acute inflammation—suppurative process often extends beyond the alveolus of the affected tooth, and sometimes followed by erosion of the cementum and necrosis of the socket.

2. Case of necrosis and exfoliation of left side of inferior maxillary from second bicuspid to articular extremity of the bone, came under observation of author in 1840—inflammation of the peridental membrane of the first molar had been produced by attempt to extract the tooth—the crown was broken and the roots left in the jaw—inflammation extended from anterior part of socket to entire back part of bone.

3. Acute inflammation, after terminating in suppuration, often assumes a chronic form—in this case, when favored by cachectic habit of body or constitutional vice, often gives rise to destruction of alveolus and loss of tooth.

4. Chronic inflammation not always preceded by acute—often results from tumefaction and ulceration of margins of gums—peridenteum usually ulcerates and throws out fungous granulations—roots of the tooth often eroded by purulent matter.

5. Treatment of chronic inflammation of peridenteum the same as that of chronic inflammation of gums to be hereafter described.

## 2. MECHANICAL ABRASION OF THE TEETH.

6. Teeth often worn away by friction when incisors of upper jaw fall plumb upon cutting edges of lower—these organs rarely sustain much loss of substance when former shuts in front of latter.

7. Entire crown of incisors, cuspids and most of bicuspids and molars worn away—gums then inflame and swell.

8. Wearing away of the teeth attributed by some writers to use of hard food, as crackers, sea-biscuit—this opinion erroneous—it is wholly attributable to manner in which the teeth come together—never occurs to great extent when lateral motion of jaw is restricted.

9. Before dental pulps become exposed by wearing away of crowns of teeth, the event anticipated by conversion of the soft tissues into osteo-dentine—this operation of economy prevents the painful consequences that would otherwise result from exposure of the pulps.

10. Crowns of upper incisors and cuspids when worn away, are sometimes replaced with artificial substitutes.

## LECTURE LV.

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### 1. FRACTURES AND OTHER INJURIES OF THE TEETH AND ALVEOLAR PROCESSES FROM MECHANICAL VIOLENCE.

#### 2. DISLOCATION OF THE LOWER JAW.

##### 1. FRACTURES OF THE TEETH AND ALVEOLAR PROCESSES.

1. TEETH and alveolar processes sometimes fractured and otherwise injured by mechanical violence—nature and extent of injury depends upon amount of violence, the instrument with which it is inflicted, the physical condition of the teeth, and the constitutional susceptibility of the individual—tooth may be loosened by a blow and not sustain permanent injury, or it may give rise to inflammation and disorganization of the pulp and necrosis of the socket.

2. Tooth of dense texture in healthy mouth may be deprived of a portion of its substance by a blow and not be seriously injured—in forming opinion as to result of injury, character of the tooth and state of general health must be considered.

3. When only small portion of tooth is broken off, surface should be made smooth with file, that it may not afford lodgment to extraneous matter or mucous secretions of mouth—if tooth is loosened and inflammation of investing membrane supervene, it should be combated by application of leeches to gum, and mouth frequently gargled with cooling astringent lotion.

4. Tooth knocked from its socket, if immediately replaced, sometimes becomes firmly united to surrounding parts and is

retained without injury to alveolus or gum—manner in which connection with general system is effected.

5. Fracture of alveolar processes—remedial indication of—cases treated by author.

## 2. DISLOCATION OF LOWER JAW.

6. Manner of articulation of condyles of inferior maxillary with temporary bones, renders dislocation very difficult—luxation when it takes place is always forwards.

7. Dislocation rarely caused by a blow, except inflicted when mouth is open—occurred oftener by yawning or laughing—sometimes occurs in extraction of a tooth and in attempting to bite very large substance—case related by Sir Astley Cooper of boy who had jaw dislocated by suddenly putting apple in mouth.

8. Luxation having taken place once, jaw ever after more liable to same accident—precautions recommended by Mr. Fox to prevent recurrence of.

9. When jaw is dislocated, mouth remains wide open, and cannot be closed until condyles are returned to articular cavities—sometimes only one condyle is displaced; at other times both.

10. Manner of reducing dislocation.

## LECTURE LVI.

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### SALIVARY CALCULUS.

1. FORMATION of this substance more abundant on teeth of some persons than those of others—is composed of earthy salts and animal matter, relative proportions varying according as it is hard or soft—no two analyses give precisely same results.
2. Consistence and color of salivary calculus as variable as its chemical constituents—these depend on temperament and general health of individual on whose teeth it is deposited—principal components, phosphate of lime, fibrina and cartilage.
3. This substance accumulates more rapidly during febrile and inflammatory diseases than in health—chronic inflammation of the gums also favors its deposition.
4. Varieties of salivary calculus designated black dry and black humid tartar—brown, of which there are several shades, the pale yellowish brown, green and soft white—black and dark brown contain more earthy salts and less animal matter than any of the other varieties—also deposited in smaller quantities, except the black humid.
5. White tartar never accumulates in as large quantities as the light or yellowish brown—forms rapidly and dissolves more slowly in acids than any of the other varieties—is softer, being almost wholly composed of animal matter.
6. Hypotheses, with regard to the source from whence salivary calculus is derived—American and English dentists believe it a salivary deposite—same opinion maintained by some French writers—Mandl thinks it composed of infusora—this opinion

erroneous—the infusora found in it have their origin in mucous secretions of the mouth.

7. Jourdain believes it secreted by glands of the peridenteum—Gariot thinks it comes from the gums—Serres pretends to have discovered glands in the mucous membrane covering the gums which secretes it—none of these hypotheses correct.

8. M. Delabarre ascribes formation of tartar to sanguinous exhalents of the gums, and endeavors to show that inflammation of this tissue exists when it is deposited—regards the arguments he adduces in support of the theory conclusive against its being a salivary deposite—alludes to the fact of earthy concretions forming on a sound when left for a length of time in urinary bladder of individuals in whom no previous tendency to calculus deposits existed.

9. The absurdity of the doctrine of Delabarre shown by Mr. Thos. Bell—calculus incrustations on the sound cannot be used as argument in favor of the theory.

10. Chemical analyses of saliva show that this fluid contains the elements of tartar as do also those of the mucous secretions of the mouth.

11. Manner of formation of salivary calculus on teeth explained.

## LECTURE LVII.

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### SALIVARY CALCULUS.

CONTINUED.

1. LOCAL and constitutional effects of accumulations of salivary calculus on teeth more or less deleterious—vitiated fluids of mouth acts as irritant to gums and peridenteum, causes alveoli to waste and teeth sometimes to drop out—often gives rise to tumors and excrescences of gums and alveolar processes.
2. Constitutional effects produced by it not less pernicious—among these are, anorexia, impaired digestion, cough, diarrhoea, head-ache, otalgia and disease of the maxillary sinus and nasal fossæ.
3. Nature of the morbid effects produced by tartar upon teeth determined by characteristics and quantity of the accumulation, and constitutional tendency or susceptibility of the individual—also to efficiency of means employed to keep teeth clean.
4. Upon the gums, tartar acts as mechanical irritant, exciting inflammation which is often followed by numerous other morbid phenomena, as discharge of purulent matter from between margins of the structure and necks of teeth, and wasting of alveoli—diseased action often extends to other parts of mouth and sometimes to maxillary antra.
5. Secretions of the mouth vitiated by it and rendered unfit to be mixed with alimentary substances and taken into stomach.
6. Disappearance of foregoing morbid phenomena on removal of tartar from teeth—cases of constitutional as well as local disease cured in this way.

7. Persons having best constitutions and finest quality of teeth, have small quantity of black dry, very hard tartar—gums have thin margins, well festooned, of pale rose color—if health becomes impaired from intemperance, debauchery or venereal disease, tartar will be deposited in large quantity on nearly all the teeth, having an uneven humid surface—first of these varieties rarely found, except on inner surface of lower incisor.

8. Dark brown tartar deposited in larger quantity than first variety of black—is found on inner surfaces of lower incisors, and buccal surfaces of upper molars—also sometimes on other teeth—more easily removed than second variety of black tartar.

9. Light yellowish-brown tartar accumulates in large quantity, exhales very fetid odor and is deposited on teeth of persons of billious temperaments—several drachms are sometimes taken from teeth—odor often so offensive as to contaminate atmosphere of small room in few minutes.

10. White tartar consists chiefly of hardened mucus, and may be scraped from teeth with finger nail—green tartar consists of clammy mucus with very little earthy matter.

11. Manner of removing salivary calculus—precautions necessary to be observed in operation.

## LECTURE LVIII.

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### THE GUMS, AND MUCOUS MEMBRANE OF THE MOUTH.

#### 1. THE GUMS.

1. The term applied to that portion of mucous membrane covering alveolar border—the gums differ from mucous membrane of other parts of the mouth in having more intimate connection with the periosteum, in being thicker, denser and endowed with less sensibility.

2. Precise limits of gums variously defined—according to some, they extend in upper jaw to roof of mouth, covering tubercles back of wisdom teeth, terminating in velum palati and constrictor muscles of fauces, and in lower jaw, extend back to roots of coronoid processes, terminating externally in substance of cheek and lips, and internally in root of tongue—others limit them to necks of teeth and alveolar border—they invest entire neck of each tooth, having free margin fourth of line in width—from free margins they are reflected back upon themselves—after passing base of crowns of teeth, reflected portion unites with periodental membrane.

3. Part of gums adhering to necks of teeth, the *ligamentum dentis* of Dr. Caldwell, but has no resemblance whatever to ligamentous tissue.

4. Central line of gums presents white, firm cartilagenous ridge.

5. Gums very susceptible to morbid impressions, and when inflamed, pressure causes pain—they are under influence of laws

of healthy and morbid association—changes observed in them in females during gestation.

## 2. MUCOUS MEMBRANE OF THE MOUTH.

6. All the passages through internal parts communicating with surface of body, lined with mucous membrane—proper texture of these membranes albuminous.

7. Exposed surfaces of mucous membrane soft and velvety—external surfaces attached to various other tissues—on the alveolar border, in ethmoidal cells, the frontal, sphenoid, and maxillary sinuses and tympanum of ear, attached to periosteum.

8. Mucous membranes present structural characters adapted to special functions they are destined to perform—is of reddish color, but degree of redness greater in some situations than others.

9. It is composed of two layers, *corium* and *epithelium*—last constitutes free surface—the other beneath this—surface of corium beneath epithelium covered with delicate, transparent lamella, called basement membrane, or *membrana propria*—different kinds of epithelium.

10. Mucous membrane of mouth continuous with skin at free edges of lips, lines inner surface of, and reflected from, to alveolar borders—fold at medium line called *frænum* of lips—covers alveolar border, floor of mouth and tongue—*frænum linguæ*—*papillæ* of tongue—thickness of membrane variable.

11. Fluid secreted by mucous membrane of mouth, clear and viscid—contains acetic, nitric, sulphuric and hydrochloric acids—structural alteration of teeth called caries mainly attributable to action of these acids.

## LECTURE LIX.

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### DISEASES OF THE GUMS.

1. SUSCEPTIBILITY of the gums to morbid impressions determined by temperament of the individual and state of general health—this structure seldom in a perfectly healthy condition, influenced as it is by certain tendencies to constitutional disease and local irritation.
2. Actual disease of gums always result of local irritation, but character of morbid action determined by habit of body, or tendency of general system to particular kinds of functional disturbance.
3. Irritation and inflammation of gums attended by increased redness and increase of arterial action; the veins become correspondingly sluggish—the smaller the last mentioned vessels, the more they become distended with blood—this tendency observed in swelling of edges and apices of gums before perceptible morbid action is noticeable in that part which covers alveolar border.
4. Alveolo-dental periosteum almost always participates in diseased action of gums—this more manifest in some cases than others.
5. Although susceptibility of gums to morbid impressions is increased by constitutional disturbance, disease of this structure affects functional operations of other parts of body.
6. Inflammation of lining membrane of tooth often extends to gums—case illustrative of fact.
7. Gums more susceptible to disease previous to fifteenth and after forty-fifth year of age than between these epochs of life—

during shedding of temporary and eruption of permanent teeth, this structure peculiarly excitable and liable to irritation and inflammation.

8. Susceptibility of gums to morbid impressions increased by residence in tropical climate—this, owing, not only to liability to disease requiring use of mercurial medicines, but also to debilitating effects of climate—observations of Mr. Wate and Dr. Koecker upon this subject.

9. Scorbutic individuals particularly liable to chronic inflammation and sponginess of gums, a disease popularly but erroneously designated scurvy—gums of plethoric persons also very subject to same morbid condition.

10. Gums of individuals having sanguinous temperaments very irritable and liable to become the seat of disease.

11. Passions of mind supposed to influence susceptibility of gums to morbid impressions—some increase the tendency to disease; others diminish it.

12. Nastalgia said to increase susceptibility of gums to disease—remarkable case related by Mr. Wate.

13. Vitiated condition of buccal fluids increases sensibility of gums.

## LECTURE LX.

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### DISEASES OF THE GUMS.

#### 1. ACUTE INFLAMMATION.

1. ACUTE inflammation rarely affects every part of the gums at the same time, except in cases of stomatitis, then seldom extends to subjacent fibro-cartilaginous structure—acute inflammation, in most cases, a local disease, occasioned by irritation of dentition or inflammation of the membranes of a tooth—often extends to sub-maxillary glands and muscles of face.

2. Treatment consists in removal of cause.

#### 2. CHRONIC INFLAMMATION.

3. This affection variously designated—sometimes called "*scurvy of the gums*"—termed in its more advanced stages by French writers of last century, "*conjoined suppuration*," because complicated with discharge of purulent matter from between edges of gums and necks of teeth—"devastating process" the appellation given to it by Dr. Koecker, because attended by wasting from necks of teeth.

4. Margins of the gums swell and assume a spongy appearance, and ultimately gradually recede from necks of teeth—these morbid phenomena usually first developed around lower front teeth and upper molars.

5. Local irritants, which give rise to the disease, are salivary calculus, vitiated salivary and mucous secretions of mouth, decayed, dead or loose teeth or roots, teeth deviating from normal

position in alveolar arch, shedding of temporary, and eruption of permanent teeth, blows upon the teeth.

6. In best constitutions, disease consists in slight tumefaction of edges and apices of gums and increase of redness—progress very slow and no perceptible discharge of purulent matter, provided proper attention to cleanliness of teeth is observed—neglect of this precaution followed by gradual recession and ulceration, ultimately involving alveo-dental membranes.

7. Remedial indications for above form of diseased action, removal of all local irritants, lancing gums, use of floss-silk and brush four or five times a day, and cooling astringent gurgles.

8. In scorbutic habits, disease assumes more aggravated form—gums more tumefied, margins thick and straight, constant discharge of offensive purulent matter, wasting of structure from necks of teeth, loosening, and if progress of affection not promptly arrested, loss of teeth.

9. Remedial indications same as in preceding form of disease—important that decided impression be made at once upon the affection—use of solution of nitrate of silver sometimes attended with beneficial results—lancing gums should be more thorough and apices removed.

10. In scrofulous subjects, in addition to local treatment, remedial indications of constitutional disease should be properly attended to.

## LECTURE LXI.

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### DISEASES OF THE GUMS.

#### 2. CHRONIC INFLAMMATION—CONTINUED.

1. GUMS affected with chronic inflammation in mucous habits of deeper red, margins thick, round and straight and very sensitive to touch.

2. Treatment consists in removal of local irritants, gargling mouth several times a day, frequent use of brush and waxed floss silk—best gargle, cold decoction of sage, borax and honey—decoction of cort. cinchonæ, alum and infusion of roses also recommended, as well as cooling aperients and light vegetable diet.

3. Chronic inflammation in sanguino-serous and strumous habits rarely affects physical condition and appearance of gums—only indications of disease, slight discharge of muco-purulent matter from between margins and necks of teeth when pressed—matter has only faint odor and gums remain in this condition for years without apparent change.

4. Treatment consists in regular use of brush and floss silk, gargling mouth frequently with astringent lotions—application of strong solution of nit. argent. to inner margins of gums, using precaution to keep it from teeth, often attended with decided benefit—constitutional treatment, tonic and strengthening regimen.

5. Chronic inflammation of gums with ulceration of inner surface of edges, formerly supposed to be incurable—the opinion

wholly erroneous—the disease almost always curable—Dr. L. Koecker first to demonstrate fact.

6. In billious habits, the disease progresses rapidly, gums swell, separate from necks of teeth and alveolar processes, venous capillaries engorged with blood, alveoli waste rapidly and teeth soon loosen and drop out, if morbid action is not promptly arrested.

7. Treatment same as in first two forms of disease.

### 3. MORBID GROWTH OF GUMS.

8. A form of chronic inflammation characterized by rapid morbid prurient growth, sometimes of entire substance of gums—in this variety of disease, nearly all the teeth of both jaws almost wholly covered by the morbid growth—sockets waste rapidly, and teeth, from loss of support, loosen and only retained in place by surrounding soft structure.

9. Morbid prurient growth rarely occurs, except in scrofulo-scorbutic habits.

10. Local treatment, excision of morbid growth, removal of tartar and loosened teeth, thorough cleanliness of teeth and frequent lancing of gums.

11. Appropriate constitutional treatment necessary to the cure.

## LECTURE LXII.

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### DISEASES OF THE GUMS.

4. MERCURIAL INFLAMMATION—5. ULCERATION OF GUMS AND NECROSIS AND EXFOLIATION OF ALVEOLAR PROCESSES OF CHILDREN—ADHESION OF THE GUMS TO THE CHEEKS.

#### 1. MERCURIAL INFLAMMATION.

1. INCREASED redness and tumefaction of edges of gums, first of lower incisors and afterwards of the other teeth—mucous membrane of adherent portion assumes white color—inflammation and swelling of mucous membrane of mouth generally—coppery taste and odor of breath—thickening of alveolo-dental perosteum—loosening of teeth—ulceration and sloughing of gums and necrosis of alveolar processes.

2. Treatment at first consists in keeping bowels open with saline aperients, restricting patient to farinaceous diet, gargling mouth with demulcent decoctions and mild astringent lotions—odor of breath corrected with washes of chloride of soda.

3. When inflammation assumes chronic form, lancing gums freely and use of astringent gargles most efficient remedies—when gums are ulcerated, strong solution of nit. argent. applied with advantage.

#### 2. ULCERATION OF GUMS AND NECROSIS OF ALVEOLAR PROCESSES OF CHILDREN.

4. During the shedding of temporary and eruption of permanent teeth, gums and alveolar processes sometimes become the seat of aggravated form of disease—differs from chronic inflam-

mation and ulceration, as also from *cancrum oris*, a disease, to which, in some of its characteristics, it bears some resemblance.

5. Gums as well as lips assumes deep red or purple appearance—at first muco-purulent matter discharged from between their edges and necks of teeth—this becomes ichorous, followed by necrosis and exfoliation of alveolar processes, teeth loosen and ulcers form in various parts of mouth, accompanied by burning pain in mucous membrane of cheeks and swelling of submaxillary glands.

6. Disease sometimes confined to one side of one jaw, at other times both sides of both jaws are affected.

7. The affection seems to be result of general debility, occasioned by defective nutrition, and occurs only in children of cachectic habit of body residing in close damp rooms.

8. Local treatment consists in use of acidulated and astringent gargles and solution of chloroid soda—applying occasionally to ulcerated part strong solution of nit. argent.—removal of necrosed alveoli as soon as exfoliation takes place—constitutional treatment should accord with indications of case.

### 3. ADHESION OF THE GUMS TO THE CHEEKS.

9. Gums and cheeks sometimes contract adhesions during cicatrization of ulcers of mouth, and occasionally such union is a congenital defect—extent of adhesion may be small or may extend to gums of entire alveolar border—ulcerations may be caused by constitutional disease, inordinate use of mercural medicines or local lesions.

10. Remedial indication consists in separation of parts with sharp bistoury, and preventing re-union during cicatrization by interposition of tents of lint.

## LECTURE LXIII.

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### TUMORS AND EXCRESENCES OF THE GUMS AND ALVEOLAR PROCESSES.

1. DISEASES of formidable character sometimes have their seat in gums and alveolar processes—these parts subject to every variety of tumor and excrescence, varying from simplest kind to cartilaginous, fungoid, osteo-sarcomatous and cancerous.

2. Character of the morbid growth, though caused by local irritation, always determined by constitutional tendency and habit of body of individual—the disease sometimes confined to the gums, at other times has its seat in alveolar periosteum.

3. Local irritants most frequently concerned in production of disease in gums and alveolar processes dead and loose teeth or roots of teeth, and teeth occupying abnormal position; also salivary calculus—influence of these irritants in originating tumors of gums and jaws acknowledged by Liston and other modern Surgeons.

4. Case illustrative of truth of above opinion, in which malignant tumor of gum over root of upper cuspid tooth, involving lip and corner of mouth, pronounced by an eminent Surgeon to be cancerous, was cured by removal of decayed teeth—other examples of malignant disease of gums traced to irritation of decayed and dead teeth—remarkable case of tumor of gums recorded by Dr. Regnoli.

5. Case of tumor of nasal cavity cured by extraction of diseased teeth—history of disease as recorded by Dr. Koecker.

## LECTURE LXIV.

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### TUMORS AND EXCRESCENCES OF THE GUMS AND ALVEOLAR PROCESSES—CONTINUED.

1. VARIABLE character of morbid excrescences of gums—some soft, others hard—some have broad base, others narrow—some have smooth surface, others rough and covered with eroding ulcers—some nearly white, others have greyish aspect—some color of gums, others dark purple—some nearly destitute of blood, others composed almost wholly of sanguinous capillaries—some have little sensibility, others so sensitive that slight pressure causes severe pain—growth of some very slow, that of others so rapid that whole mouth is filled in few months—some benign and easily cured—others malignant, and when removed, are soon re-produced.

2. Most common kind resembles very nearly structure of gums, occurring in good constitutions as a consequence of local irritation occasioned by decayed teeth or roots.

3. Last mentioned tumor usually disappears on removal of local irritant that caused it.

4. Fungoid tumors grow rapidly, filling mouth and distending jaws in few months.

5. First indication of cure, removal of all local irritants—this done, tumor sometimes sloughs off, but removal, either with knife or ligature, often necessary—last method preferable in most cases—description of operation.

6. Epulis—description of case of, cured by extraction of tooth and removal of outer wall of alveolus.

## LECTURE LXV.

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### ALVEOLAR ABSCESS.

1. INFLAMMATION and suppuration of lining membrane and pulp of tooth, usually precedes formation of alveolar abscess—these morbid phenomena give rise to inflammation of alveolo-dental periosteum at extremity of root, lymph is effused, tubercle forms, suppuration takes place and pus secreted; this enclosed in sac formed by the effused lymph.
2. During development of above morbid phenomena, bottom of alveolus enlarges by gradual destruction of inner walls—opening made through side of socket and gum for escape of pus contained in sac at extremity of root—opening usually through buccal or labial wall, though sometimes made through palatine.
3. Formation of abscess in socket of lower dens sapientiae sometimes attended by inflammation and swelling of tonsils and muscles of cheek, followed occasionally by trismus—several cases have come under observation of author.
4. During formation of abscess, deep-seated throbbing pain, often almost insupportable, experienced—this measurably subsides when suppuration takes place—tooth slightly raised from socket from thickening of alveolo-dental periosteum.
5. Inflammation, after suppuration, degenerates into chronic form, and sac often continues to secrete pus—opening through gum remaining pervious for escape of matter.
6. Walls of sac sometimes unite obliterating central cavity, when tooth recedes back to normal position in socket, and if filled to extremity of root, often remains without affecting healthy condition of surrounding tissues.

7. While abscess is forming, pain sometimes so intense as to affect functional operations of general system.

8. Abscess sometimes forms in socket of dead tooth—the tooth, acting as irritant to alveolo-dental periosteum, but more frequently purulent matter contained in central chamber, and exciting inflammation.

9. Seldom that alveolar abscess can be prevented after pulp of tooth has become the seat of acute inflammation—means employed for the purpose, consists in application of leeches to gum of affected tooth, saline purgatives and cooling regimen.

10. When inflammation has made too much progress to render these means availing, suppuration may be hastened by emollient poultices to gum.

11. Opening sometimes made through alveolus and cheek, or lower part of face, for escape of matter, disfiguring face and subjecting patient to constant annoyance—treatment necessary in cases of this kind.

12. Pus in sac of socket of upper molar sometimes discharged into maxillary sinus—remedial indications in such cases.

13. Morbid effects, local and constitutional, sometimes produced by alveolar abscess.

## LECTURE LXVI.

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### NECROSIS AND EXFOLIATION OF ALVEOLAR PROCESSES— WASTING OF SOCKETS OF TEETH—DISPLACEMENT OF TEETH BY DEPOSITES OF BONE IN ALVEOLI.

#### 1. NECROSIS AND EXFOLIATION OF ALVEOLAR PROCESSES.

1. Alveolar processes liable to necrosis—loss of vitality may be confined to socket of one tooth, or may include several or entire alveolar border and part or whole of maxillary bone—it may occur in alveoli of one or both jaws simultaneously.

2. After loss of vitality, dead part is separated from living, and when confined to sockets of teeth, exfoliated part never replaced with new bone.

3. Examples of reproduction of part and even whole of lower jaw—exercise of such recuperative powers here by economy doubted by some authors.

4. Exfoliation effected, according to some, by suppurative inflammation, but more probably, by action of corrosive fluid effused from fungous granulations of cells of living bone in contact with necrosed part—acrid sanies discharged from fistulous openings—other morbid phenomena attending exfoliative process.

5. Cases of necrosis and exfoliation of alveolar processes described by Mr. Fox—many have come under observation of author—very remarkable one related by Dr. Maynard.

6. Immediate cause of necrosis death of periosteum from inflammation, arising sometimes from dental irritation, but more frequently from constitutional action of mercurial medicines.

7. Removal of dead portions of bone, as soon as separated from living, constitutes proper remedial indication—offensive odor of fetid matter corrected by gargling mouth several times a day with solution of chloride of soda or diluted tinct. myrrh.

#### 2. WASTING OF SOCKETS OF TEETH.

8. Wasting of alveolar process preceded by slight increase of vascular action and ulatrophia of edges of gums—morbid phenomena so slight as scarcely to be observable—peri dental membrane participates in diseased action.

9. Wasting process usually very slow—commences in most cases in alveoli of cuspid teeth—sometimes begins in sockets of palatine roots of upper molars.

10. Roots of teeth exposed from gradual destruction of their sockets, often very susceptible to impressions of heat and cold, and easily affected by acids.

11. Wasting process sometimes result of disease in gums, but principal cause, want of congeniality between roots and more highly vitalized surrounding parts, arising from great density of teeth.

12. Disease never completely arrested when dependent upon last mentioned cause—progress retarded by keeping teeth constantly and thoroughly clean.

#### 3. DISPLACEMENT OF TEETH BY DEPOSITE OF BONY MATTER IN THEIR SOCKETS.

13. Teeth sometimes pushed from sockets by exostosis in bottom of alveoli—at other times forced apart by thickening of one side of alveolar wall.

14. Above morbid phenomena, the result of irritation of alveolar periosteum.

15. Remedial indications.

## LECTURE LXVII.

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### MORBID EFFECTS OF DISEASED TEETH AND GUMS.

1. DEPENDENCIES subsisting between teeth and other parts of the body accounts for constitutional effects of disease in these organs and gums—law of animal economy that one organ should sympathize with another—morbid sympathy not the only way in which disease of dental organism affects the general system.

2. Proper mastication of solid aliments necessary to well being of general economy, and this function cannot be performed when teeth and gums are materially affected by disease—animalization supposed by some to commence in the mouth, and the saliva to be one of the most useful digestive fluids—this, vitiated by disease of teeth and gums.

3. Putrid and offensive matter thrown off by decayed teeth and gums, mixed with alimentary substances and taken into stomach, impairs digestive functions, and otherwise exerts deleterious influence upon the general health—it also affects the air passing to and from the lungs, giving rise to disease of last mentioned organ.

4. Dr. Rush's opinion with regard to the influence of decayed teeth and ulcerated gums on the general health, and their connection with many chronic diseases.

5. Case of dyspepsia complicated with general debility and derangement of entire nervous system, cured by extraction of decayed teeth, and restoration of gums to healthy condition—other morbid phenomena produced by disease of dental organism.

## LECTURE LXVIII.

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### MORBID EFFECTS OF DISEASED TEETH AND GUMS.

CONTINUED.

1. Two remarkable cases of disease occasioned by dental irritation reported to author by the late Dr. J. M. Shepherd, an eminent Surgeon and Physician of Va.—one of the cases, a nervous affection of the head and scalp, cured by extraction of decayed teeth—the other case from neglect, terminated fatally.
2. Ozena sometimes produced by irritation of decayed teeth—remarkable case came under observation of author, caused by exostosis of root of first upper permanent molar—speedy cure followed extraction of tooth.
3. Phthisis pulmonalis occasioned by dental irritation—two cases reported to author by Dr. M. of Maryland—protracted case of dyspepsia attended by other morbid phenomena cured by restoration of teeth and mouth to healthy state.
4. Case of hemicrania occasioned by diseased teeth reported by Dr. Darwin—other cases of somewhat similar character reported by same author.
5. Epilepsy and rheumatism caused by decayed teeth—two cases described by Dr. Rush—pain and formation of matter in ear occasioned by irritation of decayed and dead teeth.
6. Other cases of local and constitutional disease produced by same cause—many have come under observation of author.

## LECTURE LXIX.

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### DENTAL HYGIENE.

1. HYGIENE, in most extended signification of term, a branch of medicine which teaches the art of preserving health—lays down rules applicable for each constitution—called by some, preventive medicine.
2. Dental hygiene consists in observance of the rules necessary to preservation of health of teeth—it implies a knowledge of the influence of the agents brought in contact with them; also that of the various conditions of the general system.
3. Rules of general hygiene must harmonize with the temperament and habit of body of each individual—child subject to hygienic influences as soon as it comes into the world—health of the teeth, as much as that of the whole body, depends upon the care bestowed upon them.
4. Operations of economy, during infancy and childhood, have much to do in determining physical condition of the teeth—hence a knowledge of hygiene of dental organism embraces that of the general system—is therefore more extensive than many suppose.
5. Prevailing ignorance of the means necessary for prevention of disease in teeth and gums—dentists have not given as much attention to the subject as its importance demands.
6. Influences teeth are exposed to during infancy determine their susceptibility to disease through future life—if these are favorable, the organs will be well formed, well arranged, and with proper care, remain healthy to advanced age.

7. Irregularity or crowded arrangement prejudicial to health and durability of teeth, also cause of disease in gums—dentist should endeavor to prevent such conditions—most regular, whitest and most beautiful teeth often have soft texture, and easily acted on by corrosive agents—accumulations of tartar on teeth affect the health of gums and alveolar processes.

8. Apart from physical condition, neglect of cleanliness the chief cause of caries, the most destructive disease to which teeth are liable—importance of impressing upon minds of parents and those having care of children, frequent and regular attention to this salutary observance—dentist should embrace every suitable opportunity of doing so.

9. First care however should be directed to promote formation of good teeth, such as shall be least susceptible to action of chemical agents—regimen of infants should be directed by one thoroughly versed in rules of health.

## L E C T U R E L X X.

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### DENTAL HYGIENE.

CONTINUED.

1. IMPORTANCE of preservation of temporary teeth—effect of premature loss upon alveolar arch and permanent teeth—circumstances rendering extraction necessary.
2. Temporary teeth, under proper hygienic influences, preserved, in most cases, until removed by operation of economy.
3. Formation of permanent teeth affected by condition of temporary—disease of latter often impairs general health—organism during early childhood more susceptible to impressions than after all the organs of body have acquired full vigor of maturity.
4. Physical peculiarities of teeth often transmitted from parent to child, unless offspring is placed under different hygienic influences.
5. Temporary as well as permanent teeth often affected previous to eruption by acidulated condition of fluid contained in dental sacs—the former, however, more frequently than the latter, but formative process frequently affected when fluid of sacs is not acidulated.
6. Preservation of temporary teeth promoted by cleaning them regularly four times a day with suitable brush and floss silk—manner of using brush and floss silk—use should be commenced as soon as crowns are through the gums.
7. Certain alimentary substances and confectionary supposed to affect teeth prejudicially.
8. System of dental hygiene recommended by Dr. L. S. Parmly.

## LECTURE LXI.

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### DENTAL HYGIENE.

CONTINUED.

1. MERCURY, its effects on the teeth—does not exert direct action upon these organs—indirectly they are seriously affected by it—much diversity of opinion with regard to its *modus operandi* upon the general system—manner in which teeth are affected by use of this potent agent.

2. Supposed effects of tobacco on the teeth—some think use of it contributes to preservation of the organs—this opinion based upon fact that it sometimes obtunds pain of aching tooth—relative effects of chewing and smoking—teeth not beneficially or prejudicially affected by either—sometimes produces hurtful effects upon the gums—snuff used as a dentifrice by many ladies in Southern States—constitutional health often seriously impaired by the practice.

3. All acids, both mineral and vegetable, act prejudicially upon the hard tissues of the teeth—only four which precedes the phosphoric in their affinity for the lime of the teeth, but all the others act as solvents.

4. Hot and cold beverages, as well as cold air, supposed by many to be fruitful source of disease to teeth—the opinion, though erroneous in the sense usually held, has prevailed since the time of Hippocrates.

5. Many of the powders and lotions vended for whitening and beautifying teeth, produce hurtful effects—value of tooth brushes, when properly constructed, as an hygienic agent.

## LECTURE LXXII.

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### DISEASES OF THE MAXILLARY SINUS.

#### 1. INTRODUCTORY REMARKS.

1. SHAPE and situation of maxillary sinus—existence of it not known until latter part of sixteenth century—correct description of it not given until middle of seventeenth century—sometimes called *antrum Highmorianum*, after Highmore, who was the first to describe it.

2. Maxillary sinus is sometimes the seat of disease of a very formidable character, but many of the morbid phenomena of this cavity are very simple and easily cured—important that treatment should be instituted in early or incipient stages.

3. Disease of this cavity often exists for years without being suspected—when permitted however to continue for long time, it is apt to assume a more aggravated character.

4. Morbid affections of maxillary sinus very similar to those of nasal fossæ—mucous engorgement, however, peculiar to this cavity—last mentioned affection sometimes designated by name of dropsy; at other times called purulent accumulation—all accumulations of fluid here, except such as result from disorganization of surrounding or neighboring tissues, are of a mucous or muco-purulent character.

5. Inflammation of lining membrane, the simplest form of disease to which this cavity is liable—this also usually precedes all others—sometimes subsides spontaneously; at other times it assumes a chronic form, ultimately giving rise to disease of a more formidable nature.

6. Purulent condition of secretions of antrum rarely occurs in persons of good constitutions, except opening into nose, has become obliterated—occurs in individuals of bad habits of body, and as consequence of chronic inflammation of lining membrane—other morbid phenomena sometimes result from it, as caries of bony walls of cavity and fistulous ulcers—this condition of secretions sometimes termed abscess—appellation improper.

7. Ulceration seldom idiopathic affection—occurs as a consequence of some other form of diseased action in cavity, or more frequently of some specific constitutional vice—met with oftener in scrofulous and scorbutic individuals, or those affected with venereal taint, than any others.

8. Caries of bony parieties of antrum always associated with other diseases of the cavity—it is an effect of other morbid conditions.

9. Fungous growths of various kinds often developed in antrum—the character of the disease determined by the habit of body of the individual—rarely happens that tumor of any kind is formed in the cavity in good constitutions.

10. Disease sometimes developed in antrum as a consequence of irritation produced by introduction of insects—also from injuries resulting from mechanical violence.

11. Most of the morbid affections of the cavity traceable to irritation of diseased teeth, gums or alveolar processes.

## LECTURE LXXXIII.

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### DISEASES OF THE MAXILLARY SINUS.

#### 2. INFLAMMATION OF THE LINING MEMBRANE.

1. INFLAMMATION precedes and accompanies all the other forms of disease to which the maxillary sinus is subject—it would rarely occur, the membrane being surrounded on all sides by bony walls, if dependent upon direct action of irritating agents, proximity of the membrane to roots of upper molar teeth, inflammation of their sockets often extends to and involves it in the diseased action.

2. When not complicated with morbid constitutional tendency or other disease, it usually subsides soon after removal of cause that gave rise to it.

3. Membrane, when free from disease, secretes transparent, slightly glutinous inodorous fluid—physical characters of this, changed by inflammation—they become vitiated, at first less abundant, afterwards poured out in larger quantity; are now more serous and acrid, irritating membrane of nose when they escape from antrum through natural opening.

4. Indications of inflammation of lining membrane of antrum, severe deep-seated pain in substance of cheek above alveolar border and beneath malar bone, extending to lower part of orbit, local heat, throbbing sensation and sometimes fever—these symptoms, however, not always of so decided a character as to lead one to suspect existence of disease—other morbid affections of upper jaw sometimes mistaken for inflammation of lining membrane.

5. Pain sometimes sharp and lancinating, extending from base of cavity to frontal sinus—maxillary bone not unfrequently become implicated—the disease distinguished from engorgement by absence of distension of walls of antrum and from carcinoma which occasions different kind of pain.

6. Inflammation, when not arrested, ultimately degenerates into chronic form—pain then diminishes and is less constant; is dull and confined to region of sinus, teeth become sensitive to touch and less painful—mucous membrane of nostril slightly inflamed, and thin watery fluid discharged from nose when fossa of affected side is blown with the other closed.

7. Irritation produced by decayed, dead and loose teeth, inflammation of alveolo-dental periosteum and disease of gums, mechanical violence inflicted on teeth or maxillary bone, the most frequent cause of inflammation of lining membrane of antrum—sometimes caused by exposure to sudden transition of temperature.

8. Curative indications similar to inflammation in other parts of body—they consist in removal of local irritants, leeches to gums beneath affected sinus, saline purgatives and fomentations to face.

## LECTURE LXXIV.

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### DISEASES OF THE MAXILLARY SINUS.

#### 3. PURULENT CONDITION OF ITS SECRETIONS AND ENGORGEMENT.

1. VARIOUS designations applied to purulent condition of secretions and engorgement of antrum—former sometimes called suppuration and latter dropsy—escape of pus from sac of alveolar abscess into this cavity sometimes mistaken for altered condition of secretions.

2. Purulent condition of secretions often complicated with ulceration of lining membrane, but neither condition analogous to abscess, a disease which rarely occurs in this cavity.

3. When altered condition of secretions is complicated with ulceration, the affection is similar to ozena, but without ulceration is analogous to gonorrhea, the disease, in either case, consisting in altered condition of secretions of mucous membrane.

4. Engorgement occurs only as a consequence of obliteration of nasal opening—latter occasioned by previous diseased condition of sinus—accumulation of secretions here, whether healthy or purulent, always source of irritation to lining membrane, and eventually give rise to new form of diseased action in cavity.

5. Secretions, when prevented from escaping through nasal opening, effect a passage through buccal or palatine side of alveolar ridge, or by the sides of roots of one or two teeth—matter sometimes discharged thus for several years without very manifest increase of disease—at other times, membrane ulcerates and osseous walls of cavity become carious.

6. It is only in cachectic habits that secretions of antrum are liable to become purulent—rarely occurs in good constitutions—when complicated with ulceration, nasal opening sometimes closed by lodgments of hardened floculi.

7. Young persons more subject to altered condition of secretions of antrum than middle aged or old persons.

8. Symptoms of purulent condition of secretions of this cavity dull, heavy pain above alveolar ridge in substance of cheek, soreness of teeth beneath the affected sinus and discharge of fetid matter from nasal cavity of same side—pain often extends to orbit.

9. In engorgement, the pain more acute, distressing sense of fullness felt in affected side of face, accompanied by redness and tumefaction of cheek and distension of bony walls of cavity.

10. Purulent condition of secretions results from inflammation of lining membrane, and engorgement, from obliteration of nasal opening.

11. Removal of local irritants constitutes first remedial indication of chronic inflammation and altered condition of secretions of antrum—when nasal opening is closed, artificial one should be made through most dependent part of sinus for escape of purulent matter contained in cavity—manner of making the opening—Dr. Drake the first to propose making it through alveolar border—Jourdane's method of obtaining access to the cavity.

## L E C T U R E L X X V .

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### DISEASES OF THE MAXILLARY SINUS.

#### 3. PURULENT CONDITION OF ITS SECRETIONS AND ENGORGEMENT.

CONTINUED.

1. OPENING through floor of antrum prevented from closing by keeping bougie or gold or silver tube in it until lining membrane is restored to healthy condition—manner of keeping bougie or tube in place.
2. Opening having been made, astringent and gently stimulating liquids should be injected into antrum two or three times a day for purpose of removing acrid secretions and exciting healthy action in lining membrane—for altered condition merely of secretions, alcoholic solution of tonic acid, subborate soda and South American soap-tree bark, used, in most cases with advantage.
3. Injections at first should not be too stimulating—inflammatory action sometimes increased by them.
4. Case of muco-purulent secretion of nearly twenty years standing treated by author—more than two table-spoonsful of hardened floculi discharged through nasal opening, and artificial one made through alveolar border on forcibly injecting antrum with water—dead roots and decayed teeth having been previously removed, cure was effected in about two weeks.

5. Case of altered secretion described by Bordenave, in which cure was effected by extraction of first upper molar of affected side, perforation of floor of cavity through alveolus and injecting

sinus with medicated fluid—cure in this case probably effected by affording free egress to purulent secretions.

6. Treatment adopted by Fauchard in case of engorgement—cure effected simply by extraction of tooth, root communicated with antrum and operation gave free egress to incarcerated secretions.

7. Bordenave describes case of altered secretion caused by irritation of a tooth that had been thrust into antrum—removal of this afforded egress to purulent matter, and cure was affected.

8. Last named writer describes a case of purulent secretion caused by irritation of roots of broken *dens sapientiae*—cure not effected until alveolar border lost its vitality and was thrown off by exfoliation.

9. History of a case of engorgement related by Professor Dubois caused by obliteration of nasal opening occasioned by cuspid tooth in antrum—cause of the affection having been discovered, was removed, and a cure soon followed.

10. Other cases described, in which disease was occasioned by irritation of decayed teeth, and cure effected by removal of these irritants, perforating floor of sinus and use of astringent injections.

## LECTURE LXXVI.

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### DISEASES OF THE MAXILLARY SINUS.

#### 4. ABSCESS.

1. SAC of abscess at extremity of root of tooth sometimes forms in antrum, and at other times effects a passage into it by destruction of thin lamina of bone, separating upper part of alveolus from cavity.

2. Dr. Hullihen supposes that abscess of antrum, as well as alveolar, consists in effusion of pus from pulp-cavity of tooth, between the bone and periosteum—this opinion evidently incorrect.

3. Root of second molar sometimes passes through floor of antrum, and abscess forming at extremity of it, is situated in this cavity, and when sac bursts, the matter is discharged through nasal opening.

4. Disconnected from roots of teeth, formation of abscess in antrum rarely happens—only two well authenticated cases on record—one of these described by Bordenave, the other by Mr. Bell.

5. Formation of abscess in antrum indicated by severe throbbing pain above alveolar border in substance of cheek—and when at extremity of root of tooth, by pain in and soreness of organ.

6. Cause of abscess at extremity of root of tooth, inflammation of alveolo-dental periosteum.

7. Remedial indications described.

## L E C T U R E L X X V I I .

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### DISEASES OF THE MAXILLARY SINUS.

#### 5. ULCERATION OF THE LINING MEMBRANE.

1. ULCERATION of the lining membrane of antrum never idiopathic affection, but always result of some previous morbid condition of the tissue—usually preceded by purulent condition of secretions, and often followed by fungi and caries of osseous parieties of the cavity—membrane lining floor, in majority of cases, the part first attacked.

2. Variety of character presented by ulcers of lining membrane of maxillary sinus—nature of these determined by habit of body and causes that produce them—among the varieties are, simple, fungous, scrofulous, scorbutic, gangrenous, cancerous, venereal, inveterate and carious.

3. Existence of ulceration of lining membrane of antrum indicated by deep-seated, heavy pain in cheek, escape of fetid sanies into nose on patient inclining his head to opposite side, or from one or more fistulous openings—ulcer sometimes extends from interior through bony walls and external soft tissues—opening frequently effected through cheek below orbit or canine fossa or roof of mouth—sanes often has floculi mixed with it.

4. Ulceration of lining membrane usually caused by altered or degenerated condition of secretions of sinus or some other local irritant—irritation of decayed or dead teeth most frequent cause of all the morbid phenomena of this cavity.

5. Remedial indications should accord with nature of ulcer and cause that gave rise to its formation.

## LECTURE LXXVIII.

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### DISEASES OF THE MAXILLARY SINUS.

#### 6. CARIES, NECROSIS AND SOFTENING OF ITS OSSEOUS PARIETIES.

1. BONY parieties of antrum, as well as alveolar border, and nasal, palatine and orbital bones, sometimes involved in caries and necrosis—softening, an affection to which walls of the sinus are less subject—osseous tissue often affected with caries for months without losing its vitality—but during progress of disease, fetid sanies is discharged from one or more fistulous openings through alveoli, gums, roof of mouth or cheek—termination, usually, in decomposition or death of affected part.

2. When any portion of walls of antrum are affected with necroses, soft parts in contact with dead bone inflame, ulcerate and discharge fetid sanies—gums, in this case, sometimes become gangrenous and slough—destruction of vitality of affected bone not unfrequently goes on slowly, and necrosed tissue exfoliates in small pieces.

3. Foregoing morbid phenomena, as well as softening of walls of cavity, always preceded by some other form of diseased action.

4. Diagnosis of diseases of antrum so difficult that caries and necrosis sometimes exist for weeks without being suspected—softening of bony parieties not so liable to be mistaken for other morbid affections of the cavity—in last mentioned disease, walls of sinus yield to pressure, and when this is removed, immediately regain former shape or condition—caries and necrosis indicated by dark colored fetid sanies and exfoliation of pieces of bone—

also by contact of probe with denuded tissue on introducing it in antrum.

5. Caries and necrosis of alveolar border more easily ascertained—gums inflamed and have dark purple or livid appearance—separated from sockets of teeth, and not unfrequently slough and expose caried or necrosed bone.

6. Suppurative inflammation or destruction of periosteum, immediate cause of caries and necrosis of osseous parieties of antrum—these may result from purulent condition of secretions, engorgements, tumors, blow upon cheek, or other mechanical violence—also from irritation of diseased teeth—pressure from incarcerated fluids probably most frequent cause.

7. Softening of bony walls the result of action of solvent fluid whereby earthy salts are decomposed.

8. First remedial indication, as in cases of engorgement and altered secretion, consists in obtaining free egress for fluids which may have accumulated in antrum, and when disease is complicated with other morbid affections of the sinus, treatment appropriate for cure of such disease should be first instituted—when disease is result of malignant or incurable affection of soft tissues, resources of art will prove of little avail—when the whole of maxillary bone has become implicated, all that can be done is to palliate the symptoms.

9. History of case treated by author, in which the floor of sinus and alveolar border were exfoliated—case related by Bordenave of necrosis of part of maxillary bone occasioned by incarcerated fluids of sinus.

## LECTURE LXXXIX.

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### DISEASES OF THE MAXILLARY SINUS.

#### 7. TUMORS OF THE LINING MEMBRANE AND PERIOSTEUM.

1. FUNGOUS and other tumors sometimes developed in antrum, but existence of such morbid productions rarely discovered or suspected until they have filled the cavity and, more or less, distended its walls and given rise to other morbid phenomena.

2. Pressure of tumor sometimes elevates floor of orbit, forcing eye partially from socket—depresses palatine arch and alveolar ridge, causing teeth to loosen and occasionally to drop out—fungal tumors often escape, after filling antrum, through alveoli into mouth, filling it, and forcing jaws apart and protruding in large masses.

3. Morbid growths occupying antrum do not always originate in it—they sometimes have their origin in pituitary membrane of nose, frontal sinus or ethmoidal cells, and finding their way into this cavity, augment in size until they fill it—at other times, tumors originating here escape into the nose and are mistaken for polypi of nasal fossæ.

4. Tumors of this cavity are as variable in character as the causes that give rise to them and state of constitutional health and habit of body of different individuals, differing in appearance, structure and malignancy—some have their origin in lining mucous membrane, others in periosteum.

5. Formation of polypi in antrum doubted by some writers, but there are several, apparently well authenticated, cases of their occurrence on record.

6. Indications of tumor in antrum not very apparent during first stages of formation—existence of morbid growth here seldom suspected until sinus is filled and its walls distended, accompanied by swelling of cheek, depression of palatine arch and alveolar border, loosening of upper molars of affected side, inflammation and tumefaction of gums, elevation of floor of orbit and protrusion of eye, discharge of bloody sanies from nose or fistulous openings through cheek, alveolar ridge or palatine arch—occurrence of these phenomena renders diagnosis certain.

7. During growth of tumor, especially after it has filled the sinus, pain of a more or less severe character is experienced—if morbid growth is of malignant nature, pain is sometimes almost insupportable.

8. Tumors of antrum seldom form spontaneously as a mere consequence of constitutional tendency—they are always result of local irritation, but character of the morbid growth is determined by habit of body of the individual or specific constitutional vice.

9. Treatment consists in the entire removal of diseased structure, and this rarely successful, unless operation is performed before surrounding parts have become implicated in diseased action.

10. Previous to removal of morbid growth, large opening is made into antrum—most suitable place for this and manner of removing tumor described.

11. When surrounded tissues are involved in diseased action, it is sometimes necessary to remove entire maxillary bone—manner of performing operation described.

## LECTURE LXXX.

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### DISEASES OF THE MAXILLARY SINUS.

#### 8. EXOSTOSIS OF BONY WALLS.

1. DEVELOPMENT of exostosis upon osseous parieties of antrum, a disease of rare occurrence and doubted by some authors—the disease as presenting itself on other bony tissues of body, divided by some into true and false—the one composed wholly of bone, the other consisting of mere thickening of periostial tissue, or of ossific matter and fungous flesh—others divide it into periostial, medullary, cartilaginous and fungous.
2. Case of exostosis of each antrum described by Sir Astley Cooper,—each of which extended to orbit and forced eyes from sockets—one entered brain and caused death of patient.
3. Origin and progress of disease very insidious—symptoms, at first, when it originates as consequence of venereal vice, severe pain extending to every part of affected bone, afterwards confined to portion which is seat of disease—in scrofulous individuals, pain duller and less severe—when resulting from local irritation, symptoms differ but little—as the exostosis progresses, other morbid phenomena are developed, as inflammation of lining membrane and altered condition of secretions and ulceration.
4. Nature of morbid growth cannot be determined with certainty until walls of antrum are distended by it, which will then offer firmer resistance to pressure than any of other morbid growths of cavity.
5. Exostosis of antrum supposed to be result of constitutional disease, as scrofula and venereal vice, but were it not for local irritation, it would not probably develop itself.

6. Treatment of disease, supposing it to be result of constitutional vice, consists in use of means indicated by nature of vice, and upon existence of which, the exostosis owes its origin—such treatment only successful in incipient stage of morbid growth—topical applications recommended by Boyer, such as fomentations, cataplasms, &c.—same writer recommends use of mercury.

7. After exostosis has attained large size, complete removal the only successful treatment that can be adopted—before this is done, large opening must be made into sinus through alveolar border or canine or malar fossa—great care necessary in performance of operation.

8. Operation for removal of bony tumor of antrum performed by Dr. Rodrigues—successful result.

9. Case reported by Bordenave.

## LECTURE LXXXI.

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### DISEASES OF THE MAXILLARY SINUS.

#### 9. WOUNDS OF BONY PARIETIES—FOREIGN BODIES IN ANTRUM.

##### 1. WOUNDS OF THE BONY PARIETIES.

1. MAXILLARY sinus less subject than most other parts of body to injury from mechanical violence—walls sometimes fractured by blow or pierced by sharp-pointed instruments, and shot from fire-arms occasionally lodged in the cavity.

2. Effects resulting from injuries produced by mechanical violence depend upon their nature and extent, also upon condition of general system at time of their infliction—lodgment of foreign bodies in cavity, when not immediately removed, not unfrequently become hidden source of disease—two cases of the kind related by Bordenave.

3. Treatment of wounds of antrum determined by nature and extent of injury—simple fracture of walls of sinus or penetration of sharp-pointed instrument, rarely followed by serious consequences—when complicated with introduction of extraneous body into cavity, removal of this constitutes first and most important remedial indication.

4. Case of a man struck by Dirk knife above right superciliary arch, blade passing through corresponding eyelid downwards and backwards and penetrating antrum—wound was properly dressed and healed in few days—patient thought portion of Dirk-blade remained in roof of mouth, but no remains were found on examination—wound was inflicted in May, 1840, and in August, 1842, small black speck was seen half inch from interval between

first and second molar, which, on removal, proved to be fragment of blade, inch and one-fourth in length and three-fourths in width.

## 2. FOREIGN BODIES IN ANTRUM.

5. Foreign bodies often introduced into antrum through wounds, penetrating the cavity, and sometimes through opening, communicating with it from nose—Bordenave mentions case in which several worms were, at different times, discharged through fistulous opening, penetrating the sinus—other examples of same kind have been recorded.

6. Indications of insects or other foreign bodies in antrum usually very obscure, and diagnosis difficult.

7. Removal constitutes proper remedial indication.

## LECTURE LXXXII.

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### DISEASES AND DEFECTS OF THE PALATINE ORGANS.

1. DEFECT of palatine organs result from changes of structure produced by disease or from malformation—the first are *accidental*—the second *congenital*—effects of both upon voice, speech, mastication and deglutition the same—these functions impaired in proportion to extent and nature of defect.

2. Among diseases which sometimes attack palate, are,

#### 1. TUMORS.

3. Palate less subject to morbid growths than gums and alveolar processes—tumors of palate as variable in character and appearance as similar morbid productions of other parts of body—their occurrence interferes with functions of mastication, deglutition and speech.

4. Tumors of palate supposed by some to be always result of specific constitutional vice—others believe they sometimes occur independently of morbid diatheses of general system—character of disease, no doubt, determined by habit of body, but local irritation the immediate or exciting cause in all cases—diseased or dead teeth, ulcers of mucous membrane and necrosed bone, the irritants most frequently concerned in their production.

5. Morbid productions of palate sometimes disappear spontaneously on removal of local exciting cause—in most cases extirpation constitutes proper remedial indication—manner of performing operation—case of supposed cancerous excrescence of palate extirpated by Guyard and recovery of patient.

2. CARIES AND NECROSIS OF PALATE BONES AND ULCERATION OF MUCOUS MEMBRANE.

6. Caries and necrosis of palate bones always attended by ulceration of investing soft tissues—structures separating buccal and nasal cavities, destroyed by above named diseased conditions—during progress of disease, fetid sanies discharged from one or more fistulous openings into mouth and nose—case treated in infirmary of this institution.

7. Caries and necrosis rarely occur in these bones, except in individuals in whom there exists some specific constitutional vice and most frequently venereal—local irritation the exciting cause in most instances.

8. After removing all sources of local irritation, constitutional treatment, according with indications of case, to be adopted—during progress of disease, mouth should be frequently gargled with astringent and detergent lotions, correcting fetor of offensive matter with solution of chloride of soda.

9. Jourdain relates the history of a case of caries of left palate bone with fistulous opening, supposed to be the result of venereal vice—cured by extraction of roots of three or four teeth—venereal vice often suspected when none exist.

10. Necrosed portions of bone to be removed as soon as exfoliation takes place.

## LECTURE LXXXIII.

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### DISEASES AND DEFECTS OF THE PALATINE ORGANS.

#### 2. INFLAMMATION & ULCERATION OF THE VELLUM AND UVULA.

1. INFLAMMATION of vellum and uvula, attended by pain, increase of vascular action, swelling and sometimes by difficult deglutition—disease usually terminates in resolution, but occasionally in ulceration and less frequently in gangrene—resolution indicated by gradual subsidence of morbid phenomena—ulceration, by several white or grayish-white spots on vellum and uvula, and gangrene, by dark purple and afterwards nearly black color and sloughing—last termination very rare.

2. Uvula, when elongated, rests on tongue, producing irritation and impeding deglutition, sometimes causing cough, and is attended by sense of suffocation.

3. Vellum and uvula less frequently the seat of ulcers than other parts of mouth—ulcers here may be simple, aphthous, scrofulous, cancerous, scorbutic or venereal—last mentioned occur more frequently than last three varieties, and often present same characteristics as ulcers resulting from other specific vice.

4. Protracted use of mercury sometimes gives rise to ulcers of vellum and uvula—occurrence of them in this case is preceded by copperish taste in mouth, increased flow and viscosity of saliva, swelling of gums, loosening of teeth and peculiar odor of breath.

5. Exposure to cold and moisture often cause of inflammation of vellum and uvula—sometimes results from local irritation, as mechanical injury, dead and loose teeth, and acidity of buccal and gastric fluids—ulceration may occur as a consequence of in-

flammation thus produced, but the character of the ulcer is determined by habit of body or state of general health—elongation of uvula, from inflammation, relaxation or serous infiltration.

6. Treatment of simple inflammation consists in gargling throat with decoction of sage, subborate soda and honey, or with infusion of capsicum—that of elongated uvula, when it rests upon tongue, and does not yield to astringent and exciting gargles, removal of portion of organ—manner of performing operation.

7. Veneral ulcers requires appropriate constitutional treatment—local remedies seldom of much advantage—for mercurial ulcers, bowels to be kept open with saline aperients, and mouth gargled several times a day with astringent lotions.

### 3. ACCIDENTAL DEFECTS.

8. These result from constitutional disease, and consist in simple perforations of vault of palate or vellum, and in destruction of entire vault with large portion or whole of vellum.

### 4. CONGENITAL DEFECTS.

9. These consist in division of hard and soft tissues of greater or less extent along median line, sometimes confined to palatine vault; at other times extending through vellum and alveolar border, communicating with both nostrils, and often complicated with division of upper lip—alveolar border often divided in two places.

10. Functional disturbances occasioned by defects of palatine organs.

## LECTURE LXXXIV.

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### DISEASES AND DEFECTS OF PALATINE ORGANS.

#### 5. MANNER OF REMEDYING DEFECTS OF PALATINE ORGANS.

1. CONGENITAL defects of palate, especially of the vellum, often remedied by surgical operation, termed *staphyloraphy*, but mechanical substitute more frequently resorted to, and nearly always when defect is result of disease.

2. Circumstances under which staphyloraphy may be performed—manner of performing it, and precautions necessary to secure successful result—success of operation often defeated by occurrence of circumstances beyond control of the surgeon—without consent of patient, operation cannot be made.

3. Simple opening in hard palate sometimes closed by plastic operation, termed staphyloplasty—opening, when not very large, can often be closed by granulation of edges induced by application of caustic or actual cautery—tincture of cantharides has been employed for same purpose by Dieffenbach with success.

4. Artificial obturators and palates designed for closing openings in roof of mouth, and supplying losses of structures that cannot be remedied by surgical operations—these have been used for many centuries, and ingenuity taxed to utmost extent in their construction.

5. Simple palate plate attached by clasps to natural teeth—manner of construction.

6. Palate plate with drum on upper convex surface to fill opening in roof of mouth—advantages derived from it and manner of construction.

*Collins*

7. Artificial palate with vellum and uvula—various methods of constructing—Hullihen's artificial palate—Blandy's—relative advantages of two last.
  8. Palate plates complicated with artificial teeth—Rowell's palate plate and drum with artificial teeth.
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### L E C T U R E L X X X V .

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#### SURGICAL TREATMENT OF MOUTH, PREPARATORY TO APPLICATION OF ARTIFICIAL TEETH.

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### L E C T U R E L X X X V I .

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#### ORDER IN WHICH DENTAL OPERATIONS SHOULD BE PERFORMED.